Original Article
Orthopaedics

ACL RECONSTRUCTION WITH PATELLAR TENDON AND HAMSTRING GRAFTS – WHICH IS A BETTER CHOICE??

Sapan D S[1], Sunilkumar P D[1], Manjunath Daragad[1], Manjunath Japatti[2]

[1] - Associate Professor, Department of Orthopaedics, SDM College of Medical Sciences and Hospital, Dharwad.
[2] - Senior Resident, Department of Orthopaedics, SDM College of Medical Sciences and Hospital, Dharwad.

Corresponding Author:
Dr Sapan DS
Associate Professor,
Department of Orthopaedics,
SDM College of Medical Sciences and Hospital,
Dharwad – 580009
Email: docsapan@gmail.com

Submitted on: 23 May 2016
Accepted on: 01 June 2016

Abstract:

Background and Objectives: Young patients with ACL tear are prone for subsequent injury to menisci and cartilage eventually triggering a process of rapid degeneration. These people do well with early ACL reconstruction. There are many sources of graft for ACL with their own advantages and disadvantages. Most widely used graft sources are patellar tendon and hamstrings. Which one among these is better is still debatable. This study aims here to evaluate the best of the two graft choices.

Materials and Methods: 29 male patients with complete ACL tear were randomized into two groups. Patellar tendon group (51.72%) was operated with patellar tendon graft and hamstring group (48.27) was operated with quadrupled hamstring graft. Patients underwent same rehabilitation protocol. Cases were assessed clinically and radiologically at presentation, 6 months and 1 year. Results were analysed with SPSS 16.0 version.

Results: Mean operative time from index injury to surgery was 16.7 weeks in patellar tendon group and 19 weeks in hamstring group. Lysholm's score improved in both groups compared to preoperative score (p-0.001). Graft site morbidity was significantly higher in patellar tendon group. One case developed patellar clunk syndrome in patellar tendon group. One case in hamstring group had symptomatic laxity at the end of 6 months follow up.

Conclusion: With no difference in clinical outcome between patellar tendon and hamstring graft but with least morbidity with hamstring graft, it is emerging as the most suitable graft for ACL reconstruction in young.

Key-words: *ACL, Hamstring, Lysholm's scoring*

Introduction:

ACL is the main anteroposterior stabilizing structure of knee.[1] ACL tears in young will give rise to episodes of instability during sporting and day to day activities. This is known to damage the articular cartilage and cause meniscal tears.[2] Though arthroscopic ACL reconstruction has become standard but debate still continues regarding graft choice. Out of various graft choices the most commonly used are the patellar tendon and multi strand hamstring tendons.[3,4] Patellar tendon is considered gold standard as there is bone to bone healing and patient returns early to pre-injury activities.[5] Patellar tendon graft has good attributes like initial quality of fixation, high initial strength and stiffness, potential for bone-to-bone healing, better stability with time.[6] Hamstring graft on the other hand has reduced donor site morbidity, fewer kneeling problems, lesser muscular deficits and less anterior knee pain in the long-term follow-up.[7] Literature review shows different results among these two grafts due to various compounding factors including different fixation techniques for the patellar tendon and hamstrings. Recently the fixation method for hamstring has become more anatomical due to aperture fixation with interferential screws like that for patellar tendon. This study hence aims at comparing clinical outcome of ACL reconstruction between these two grafts with same methods of fixation with interferential screws.

Materials and Methods:

29 male patients presented to our hospital with complete ACL tear. All cases had pre operative clinical examination and MRI scan showing isolated ACL tear. X rays were done to map out the bony anatomy. Patients with associated meniscal, chondral lesions, revision cases, and bilateral ACL tears were excluded from this study.Patients were divided into Patellar tendon (PT) and Hamstring tendon (HS) groups by simple randomization technique. The mean age in PT group was 30.57 years and in HS group 28.13 years Mean duration of time from injury to presentation in PT was 16.78 weeks and in HS group 19 weeks**.** Each patient was assessed clinically and baseline Lysholm scoring was done.

In case of PT group, 10mm of middle third of Patellar tendon was harvested through an oblique anterior knee incision with 2.5 cm of patellar and 2 cm of tibial bone plug. Bone plugs were prepared as per the size of the tunnels drilled and were fixed on either side with interferential screws. In Hamstring group, through an inch of incision at the level of tibial tuberosity over the anteromedial surface of tibia, semitendinosis and gracilis were harvested with a stripper. Graft length was measured, quadrupled and prepared with whipstitch and corresponding diameter tunnels were made in femur and tibia in anatomical fashion. In 6 cases, endobutton CL was used to fix at femoral end and interferential screws at tibial end. And the rest of the cases were fixed with interferential screws at either end.

Patients of both groups underwent same post operative rehabilitation protocol by the experts. The cases were assessed clinically and radiologically at the end of 6 months and 1 year and results obtained were analysed by SPSS v 16 for windows software. Independent t test was applied for intragroup and paired t test applied for intergroup comparison.

Results:

Out of 15 patients in PT group, one was excluded from the study as patient had rupture of the newly reconstructed ACL due to significant trauma. The mean time duration from index injury to surgery was 19 weeks in HS group and in 16.79 PT group. The Lysholm score at presentation, 6 months and 12 months follow up in hamstring group was 63.4, 85.06 and 90.13 respectively. That in Patellar tendon group at presentation, 6 months and 12 months follow up was 61.2, 84.64 & 89.71 respectively. On a subjective scale the mean Lachman score in HS was 1.53 and in PT 1.07. One case in HS (6%) group had restriction of flexion and one patient in PT (7.14%) group had extensor lag of about 10 degrees. Single leg hop test performed in both groups showed better score in hamstring group at the end of 6 months and 12 months.

When complications were reviewed it was found that one (6%) patient in HS had a symptomatic laxity (p-0.006) and in PT group two (14.2%) had pain on kneeling down and two (14.2%) had sensory loss over infra patellar region. One patient had an unexpected patellar clunk syndrome at the end of 6 months in PT group. None of the patients in any group had any tunnel widening or loss of fixation radiologically.

Table 1: Showing assessment parameters in two groups

Group	Presentation Lysholm (p-0.42)	6 months Lysholm (p-0.796)	12 months Lysholm (p-0.77)	Mean index to surgery (weeks)	Lachman 12 months (p-0.006)
Hamstring	63.4	83.06	90.13	19	1.53
Patellar tendon	61.2	84.64	89.71	16.79	1.07

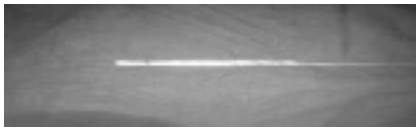

Figure 1: Showing prepared quadrupled hamstring

Figure 2: Showing harvested patellar tendon

Discussion:

Patellar tendon graft is considered the gold standard for ACL reconstruction because of high mechanical strength of graft, stability of aperture fixation and bone to bone union.[9] However recent studies favour use of hamstring tendons. Fixation of screws on both femoral and tibial side for patellar tendon is well accepted but hamstrings can be fixed on both sides either with interference screws or suspensory fixation.

Beynnon et al[10] used extracortical staple fixation for a 2 - strand semitendinosus - gracilis tendon graft and interference screw fixation for the patellar tendon graft and reported a mean side-to-side difference of 1.1 mm in the patellar tendon group and 4.4 mm in the hamstring tendon group. This correlates well with results of Lachman's testing in our study where laxity is more in HS group and less in the case of PT group**.** Except for one, none of the patients in HS group had symptomatic laxity. This was probably due to loss of aperture fixation with interferential screw.

Literature is debatable on the timing of surgery. Mayr et al[11] proposed that the status of the knee prior to surgery may be a more important factor than injury-to-surgery interval in determining optimal timing of reconstruction. In our study PT and HS group patients were operated after the subsidence of knee irritability. No significant lack of function was noted in any group as far as range of movement and muscle strength is concerned.

Beard et al[12] showed no significant differences concerning IKDC and Lysholm scores using a fixation technique with titanium interference screws for both grafts in a 1-year follow-up. But in our study in cases of HS group fixed with femoral endobutton also had comparable results with PT group at 6 months and 12 months follow up.

PT group patients had donor site morbidity and pain on kneeling compared to HS group where the morbidity was not significant. Single leg hop test was better in HS group due to good strength of quadriceps. Poolman R.W[13] observed these facts in their cumulative meta-analysis and clinically relevant sensitivity analysis applied to previously published studies. Nothing much is described in arthroscopic literature on patellar clunk syndrome in PT group as it is known to occur mainly in knee replacement surgeries.[14] Patient is waiting for further treatment.

Limitations of this study are a small sample size, different devices used for femoral hamstring graft fixation and short follow up period of one year.

Conclusion:

Even though clinically there is no significant difference between patellar tendon and hamstrings, if one considers the morbidity associated with patellar tendon harvesting, hamstrings are considered better choice of graft for ACL reconstruction.

Conflict of interest: None

Bibliography:

1. Noyes F. The Function of the Human Anterior Cruciate Ligament and Analysis of Single- and Double-Bundle Graft Reconstructions. Sports Health: A Multidisciplinary Approach. 2009;1(1):66-75.
2. Hamstring Tendon vs Patellar Tendon Anterior Cruciate Ligament Reconstruction Using Biodegradable Interference Fit Fixation - A Prospective Matched Group Analysis. Arthroscopy: The Journal of Arthroscopic & Related Surgery. 2012;28(8):e119-e120.
3. Sherman OH, Banffy MB. Anterior Cruciate Ligament reconstruction: which graft is best?.Arthroscopy. 2004 Nov; 20(9):974–80.
4. Mehran N, Moutzouros V (Bill), Bedi A. A Review of Current Graft Options for Anterior Cruciate Ligament Reconstruction.JBJS Reviews. 2015 Nov 10;3(11):e2.
5. Shelbourne KD, Wilckens JH. Current concepts in anterior cruciate ligament rehabilitation. Orthop Rev. 1990 Nov; 19(11):957–64.
6. Yunes M, Richmond JC, Engels EA, Pinczewski LA. Patellar versus hamstring tendons in anterior cruciate ligament reconstruction: A meta-analysis. Arthroscopy. 2001 Mar;17(3):248–57.
7. Charlton WPH, Randolph DA, Lemos S, Shields CL. Clinical outcome of anterior cruciate ligament reconstruction with quadrupled hamstring tendon graft and bioabsorbable interference screw fixation. Am J Sports Med. 2003 Aug; 31(4):518–21.
8. Weiler A, Scheffler SU, Südkamp NP. Current aspects of anchoring

hamstring tendon transplants in cruciate ligament surgery. Chirurg. 2000 Sep; 71(9):1034–44.

9. Sato N, Higuchi H, Terauchi M, Kimura M, Takagishi K. Quantitative evaluation of anterior tibial translation during isokinetic motion in knees with anterior cruciate ligament reconstruction using either patellar or hamstring tendon grafts. IntOrthop. 2005 Dec; 29(6):385–9.1.
10. Beynnon BD, Johnson RJ, Fleming BC, Kannus P, Kaplan M, Samani J, et al. Anterior Cruciate Ligament Replacement: Comparison of Bone-Patellar Tendon-Bone Grafts with Two-Strand Hamstring Grafts. The Journal of Bone & Joint Surgery. 2002 Sep 1;84(9):1503–13.
11. Evans S, Shaginaw J, Bartolozzi A. Acl reconstruction - it's all about timing. Int J Sports PhysTher. 2014 Apr; 9(2):268–73.
12. Beard DJ, Anderson JL, Davies S, Price AJ, Dodd CA. Hamstrings vs. patella tendon for anterior cruciate ligament reconstruction: a randomised controlled trial. *Knee*. 2001;8:45-50.
13. Poolman RW, Farrokhyar F, Bhandari M. Hamstring tendon autograft better than bone patellar-tendon bone autograft in ACL reconstruction: a cumulative meta-analysis and clinically relevant sensitivity analysis applied to a previously published analysis. ActaOrthop. 2007 Jun;78(3):350–4.1.
14. Fukunaga K, Kobayashi A, Minoda Y, Iwaki H, Hashimoto Y, Takaoka K. The incidence of the patellar clunk syndrome in a recently designed mobile-bearing posteriorly stabilised total knee replacement. J Bone Joint Surg Br. 2009 Apr;91(4):463–8.