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Functional Comparison of different types of grafts for single bundle ACL reconstruction

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Abstract

The Anterior Cruciate ligament (ACL) is the primary stabilizer of the knee and its deficiency affects Knee stability, resulting in giving way symptoms in daily and sports activities with increased the risk of intra-articular damage. Arthroscopic reconstruction of the injured ACL has become the "gold standard" method for treatment of ACL tear. However there is a controversy in literature regarding the best graft option is to replace the injured graft. The present study was aimed to study and compare the functional outcome of single bundle arthroscopic ACL reconstruction by various grafts using Lysholm Knee Activity Score.

Keywords: ACL, Hamstring, Reconstruction, Lysholm, RTA.

Introduction

The Anterior Cruciate ligament (ACL) is the primary stabilizer of the knee and prevents the knee against anterior translation of the tibia over the femur and is important in counteracting rotation and valgus stress. Anterior knee instability associated with rupture of the ACL is a disabling clinical problem. The ACL has a poor capacity for intrinsic repair. Thus patients who have knee symptoms related to ACL deficiency, may consider ligament reconstruction as a means of stabilizing the tibio-femoral joint and restoring high level function of the knee joint. The goal of treatment of an anterior cruciate ligament deficient knee is to provide a stable knee.. Arthroscopic reconstruction of the injured ACL has become the "gold standard". Unfortunately, ligament reconstruction cannot recreate the anatomical, biological, biomechanical and neuro physiological properties of a native ACL. Numerous authors have described successful reconstruction of the ACL with use of a donor autograft (patellar tendon, hamstring tendon or quadriceps tendon) and allograft (Achilles, patellar tendon, hamstring tendon or tibialis anterior) tendons. However, there is no consensus to what the best graft option is to replace the injured graft. The present study was aimed to study and compare the functional outcome of arthroscopic ACL reconstruction by various grafts using Lysholm Knee Activity Score with the minimum follow-up up to 6 months.

Materials and Method

This prospective study of 24 patients presented in Department of Orthopaedics, Gandhi Medical College,

Bhopal from May 2018 to May 2020 with complaint of knee pain or stability who were diagnosed to have ACL tear. Patients who satisfied the inclusion criteria (>20 yrs old, both sexes with clinical or radiological evidence of ACL tear with no previous history of surgery in the same knee) were included in the study. Patients having multiple bilateral ACL tear, associated lower limb fractures or multi ligamentous injuries were excluded. The clinical assessment involved detailed history with clinical examination .Patient workup included X-rays of the involved knee joint-anteroposterior and lateral views, MRI imaging evaluation and Lysholm knee activity score along with routine investigations.

Consent for surgery was obtained after explaining the risk benefit ratio .After obtaining pre-anesthetic clearance, surgical procedure was carried out using standard portals and techniques under tourniquet. Hamstring Quadruple Graft, Peroneus Long us graft and Bone Patellar Tendon Bone graft were harvested. Tibial and femoral tunnel were prepared and graft is fixed with Endo button and Interference screw.

Figure 1: Hamstring ACL Graft Harvesting

Figure 2: Patellar Tendon Graft Harvesting

Compression bandage and hinged knee brace was applied to all cases during the immediate postoperative period and was continued till two weeks post-op. Wound inspection and check dress was done on the 3rd postoperative day. Isometric quadriceps and ankle mobilization exercises and knee ROM exercises were started on 1st post-op day. Weight bearing was allowed from 2nd day as tolerated with crutches and Full weight bearing was achieved by 2 weeks. Passive ROM exercise was started from 3rd postop day and active ROM around 90 degree was targeted by 3 weeks. By 3rd week, Isotonic closed chain exercises were started and progressed to Open chain exercises using free weights after 2 weeks. Proprioceptive exercises and Cardiovascular fitness were begin after 8 weeks Postoperatively, functional activities climbing were allowed after 3months.Sports activities were allowed after 6 to 9 months depending on the recovery of the patient. Patients were followed at regular intervals-3months, 6months and 12 months. Patients were assessed at every visit with clinical tests and Lysholm knee activity score. All the collected data were entered into Microsoft Excel and statistical analysis was done using SPSS software. The monitored and calculated parameters were analyzed using paired t-test for

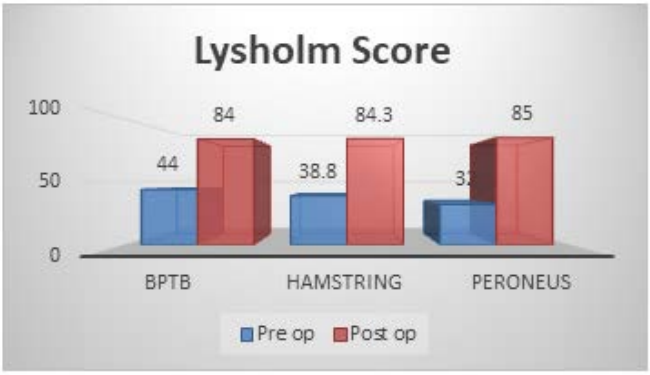
comparison between pre-operative and postoperative outcomes with p value of <0.05 considered significant.

1. Results and Discussion

Following observations are based upon the prospective observational study conducted at Department of Orthopaedics, Gandhi Medical College Bhopal from May 2018 to May 2020 comprising 24 cases.

Out of 24 cases operated, majority of the patients were treated using hamstring and peroneus grafts (10 patients each). 4 patients (16.4%) were treated with BPTB graft.

Graph 1: Functional Evaluation



As depicted in Table 1, Preoperatively the mean Lysholm score in patients who received BPTB, Hamstring and Peroneus grafts were 44, 38.8 and 32 respectively which mean score of 36.83. Whereas, after operation, the same scores for these grafts were 84, 84.3 and 85 respectively with the means scoring of 84.54. This difference in all three types of graft was statistically significant.

Due to the ever-increasing RTAs and increased participation in sporting activities, there is an increase in incidence of ligament injuries of the knee, most common being the ACL. Surgical reconstruction of ACL along with Accelerated rehabilitation programs has become the standard of care to restore its function. The choice of graft is a topic of great debate in recent years. The various options include bone patellar tendon bone graft, hamstring autograft, quadriceps tendon, various synthetic grafts and allograft.

In the present study, Functional evaluation was performed with Lysholm Knee Activity Score which are designed specially for evaluation for injuries involving knee ligament. During pre op evaluation, the mean Lysholm score in patients who received BPTB, Hamstring and peroneus grafts were 44, 38.8 and 32 respectively which mean score of 36.83. Whereas, after operation, the same scores for these grafts were 84, 84.3 and 85 respectively with the means scoring of 84.54 There was significant improvement in post-operative IKDC score when compared with preoperative score.

Li et al concluded that ACLR with PT or HS autografts achieved similar postoperative effects in terms of restoring knee joint function, graft failure and incidence of re-operations related to the meniscus. HS autografts were inferior to PT grafts for restoring knee stability, but were associated with fewer postoperative complications. Romanini et al reviewed 30 studies and demonstrated that PT grafts appeared superior to HS grafts in terms of stability, return to pre-injury level activity and flexion strength. HS autograft was associated with less anterior knee pain and less risk of extension loss compared with PT autograft.

Xie et al showed that PT autograft might be superior in resuming rotation stability of the knee joint and allow patients to return to higher levels of activity in comparison to HS autograft after ACLR. From the above data, it can be seen that the post-op Lysholm Knee Activity Score in this study was comparable with the scores from other studies.

Conclusion

Present prospective study was conducted in Department of Orthopaedics, Gandhi Medical College, Bhopal from

May 2018 to May 2020 comprising 30 patients to clinically evaluate the results of arthroscopic anterior cruciate ligament reconstruction using various types of graft. Majority of the patients were treated using hamstring and peroneus grafts (10 patients each).

4 patients (16.4%) were treated with BPTB graft. Functional evaluation was done using Lysholm Knee Activity Score which was found to be improved significantly as the mean Preop Lysholm score in patients who received BPTB, Hamstring and Peroneus grafts were 44, 38.8 and 32 respectively which mean score of 36.83.

Whereas, after operation, the same scores for these grafts were 84, 84.3 and 85 respectively with the means scoring of 84.54 which statistically significant (p value <0.005). Hence it is concluded that all the three graft used have shown equal potential in ACL reconstruction in present study especially in young athletes and high demand individuals. It not only significantly increases the stability of the knee but also improves functional outcome of injured knee with early return to sports.

Limitations of this study are - Small sample size, Short duration of follow-up and Unavailability of KT arthrometer. In consequence of above mentioned reasons, studies of large sample size, longer duration follow up with KT arthrometer based objective evaluation are required in future to assess the outcome of this procedure and to see persistence of improved knee score and function with a high level of evidence.

Abbreviations

ACL- Anterior Cruciate Ligament, RTA-Road Traffic Accident, SD- Standard Deviation, ROM- Range of Motion, BPTB- Bone Patellar Tendon Bone.

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