

Prospective Study To Assess Functional Outcomes In Patients Undergoing Single Bundle Arthroscopic Reconstruction Of Primary Anterior Cruciate Ligament Tear Comparing With Bone Quadriceps Tendon Versus Hamstring Tendon Autograft

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Introduction : Anterior cruciate ligament (ACL) injuries are one of the most common ligament injuries of knee. Arthroscopic ACL Reconstruction has become the standard of care for ACL injuries in the active patient. In present study good Bone Tendon Quadriceps (BTQ) autograft and Hamstring Tendon (HT) autograft will be used for primary arthroscopic ACL reconstruction and its data regarding clinical and functional results will be evaluated and compared.

Material and Method : Sixty patients underwent isolated ACL reconstruction. 30 underwent ACL reconstruction with the BTQ and 30 with the HT. The same surgical technique, fixation method and postoperative protocol were used in both groups. The following parameters were evaluated: functional outcome (IKDC Score), joint stability (Ant. Drawer, Lachman, pivot shift), anterior knee pain and isokinetic strength.

Result: IKDC score in bone quadriceps tendon and hamstring tendon group after 9 month follow up showing no statistical significance. The negative Lachman component was higher in the BTQ group than in the HT group. There was no difference between groups in terms of isokinetic strength.

Conclusion: Our study shows no statistical significant difference between both groups.

Abbreviations: ACL- Anterior cruciate ligament, BTQ - Bone Tendon Quadriceps, HT- Hamstring Tendon .

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Introduction

The knee is a synovial hinge type joint with extensive network of ligaments and muscles. The knee joint is largest and complex joint with a number of internal structures and is capable of performing complex and extensive movements.¹ The anterior cruciate ligament (ACL) is considered the primary passive restraint to anterior translation of the tibia on the femur, and it provides rotational stability to the knee in both the frontal and transverse planes.²⁻⁴

There is no gold standard for specific graft there is multiple graft options available for the patient undergoing ACL reconstruction. All possess unique advantages and disadvantages and can be compared using various criteria, including biomechanics properties, biology of healing , ease of harvest, associated graft morbidity .

Material and Methods

The study was conducted in orthopedic department of SGRD IMSR Amritsar. Total 60 cases of ACL tear were included for study purpose. ACL tear reconstructed in Group 1 with bone Quadriceps tendon and Group 2 with Hamstrings tendon autograft. Selection Criterion for study was as follows:

Inclusion Criteria:- Patients with complete ACL tear after 3 weeks of injury were considered for surgery and having high demand of knee bending and pivoting activity.

Exclusion Criteria:- Patients diagnosed with ACL tear associated with degenerative conditions of knee joint. Patients with multiligament injury.

Surgical procedure

The patients admitted on OPD basis and inpatient basis were interviewed with their prior consent both before and after the surgery. Patients was followed up at regular intervals of six week, three months and nine months.

Harvesting Bone Quadriceps Tendon autograft :- A suprapattellar incision of about 5cm long is performed. Skin flap was raised,exposing the entire width of quadriceps tendon and the central

portion of the tendon is harvested with a patellar bone block. The quadriceps tendon is prepared and the free end is stitched to facilitate graft passage. The diameter of the graft is measured.

Harvesting Semitendinous/Gracilis tendon autograft :- Oblique incision about 3cm antero-medially on proximal tibia starting 3-4cm distal to joint line and 3-4cm medially to tibial tuberosity was given. Semitendinosus tendon is more horizontal and lies below gracilis. It was pulled with curved clamp or a mixtar and snared with a braided suture, dissection was carried proximally up the thigh.



The tibial drill guide should be adjusted to 55degree angle and the tibial tunnel should be reamed with a cannulated reamer. With the knee maximally flexed for femoral tunnel, an over-the-top guide was inserted through the medial portal and placed in the over-the-top position at the 2-o'clock position for left knees and the 10-o'clock position for right knees.

A brace was given for a period of three weeks. Isometric muscle exercises were started at day one after the operation and gradually progressed on the basis of closed kinetic chain exercises. Indoor cycling were permitted after eight to twelve weeks depending on the patient's tolerability and squatting, jumping, jogging , running were allowed after six months. High demand sports activities were allowed after approximately nine months.

Clinical instability tests Lachman test, anterior drawer test, pivot shift test done at each follow up visits.

Results

Males were more commonly affected than female patients Right knee joint was more commonly involved than left knee joint. Road side accident was more common cause for ACL injury than twisting injury.

Table 1 Demographic Profile of Patients

	BQT Graft(mean $\pm$ SD)	HT Graft(mean $\pm$ SD)
Age	35.2 $\pm$ 4	33.8 $\pm$ 6
Sex(Male: Female)	27:03	24:06
BMI	23.2 $\pm$ 2	24.1 $\pm$ 1
Time between Injury & Surgery(Months)	12 $\pm$ 7	14 $\pm$ 5

IKDC Score preoperatively in Bone Qudericeps tendon group was 43.56 and post operatively at six weeks, three and nine months was 48.93, 65.97 and 81.55 while in hamstring tendon group it was 43.47 preoperatively and postoperatively it was 49.00, 64.22, 79.92 at six weeks, three and nine months, which is not significant. ($p > 0.05$) and improved significantly in both the groups at three, six and nine months post operatively. ($p < 0.05$)

Statistical analysis : The mean IKDC scores in both the groups were analyzed with chi square test with p value 0.05 considered significant. There is no statistical significant difference in IKDC score among at 6 weeks, 3 months as well as 9 months as p value is < 0.05 . In our study there were no significant difference on comparing the patient's ability to squat, jump, jog, run and go upstairs or downstairs pre operatively and at follow up of six weeks, three and nine months.

Table 2 Comparison of Pre operative & Post operative Functional Score

	BQT Graft	HT Graft
IKDC Score Pre Operative	43.56	43.47
Post Operative		
6 weeks	48.93	49.00
3 months	65.97	64.22
9 months	81.55	79.92

Discussion

In our study statistical analysis shows that there is no statistical significant difference among both groups at 6 weeks, 3 months as well as 9 months as p value is <0.05.

There was no significant difference on comparing the patient's ability on squatting, jumping, jogging, running and going upstairs or downstairs pre operatively and at follow up of three, six and nine months.($p > 0.05$) and improved significantly in both the groups at six week, three and nine months. Four studies compared the subjective IKDC score in those with QT and HT.⁵⁻¹⁰ Of those studies, 3 found no significant difference in the subjective IKDC score^{7,10} and 1 found a significantly better subjective IKDC score with QT.⁵ The overall IKDC score ranged from 80 to 87 with QT and from 78 to 87 with HT.

In our study mean diameter of graft used in patients with QT graft was 8.10 ± 0.51 mm on femoral side and 9.23 ± 0.63 mm on tibial side and for hamstring graft it was 7.64 ± 0.48 mm on femoral side and 8.41 ± 0.57 mm on tibial side.

Similar results were seen in a study conducted by Adrian Todor et al and found that for the QT group the mean graft diameter was 8.57 ± 0.56 (7.5-10) mm on the femoral side and 9.03 ± 0.63 (8-11) mm on the tibial side. In the HT group the grafts had a mean diameter of 7.65 ± 0.6 (7-9) mm on the femur and 8.04 ± 0.51 (7-9) mm on the tibial side. The mean length of the free quadriceps graft was 8.97 ± 0.58 (7.5-10) cm.¹¹

In our study it was observed that among Group with Hamstring graft the laxity was Grade 0 in 22 pts while 08 had grade 1 laxity. While in pts with Quadriceps tendon graft it was absent in 23 pts and 07 had grade 1 laxity. Results are statistically insignificant. Similar results were seen in study conducted by Adrian Todor et al. There were no statistically significant differences between the two groups with regard to instrumented Lachman testing, ROM, modified Cincinnati, Lysholm and SF-36 scores.¹¹ Similarly, Ralph Akoto et al also found no significant difference between the groups was found regarding postoperative knee stability, measured by the Lachman test, Pivot-Shift test or instrumental measurement.¹²

Conclusion

There was no significant difference in functional outcome and knee stability in patients of ACL reconstruction in between Bone quadriceps and hamstring tendon autografts. There was no difference between groups in terms of isokinetic strength and Range of motion at Knee joint.

So both the grafts can be suitable choice for ACL reconstruction based on surgeon choice and expertise

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