



SHORT TERM EVALUATION OF CASES OF ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION USING QUADRUPLED SEMITENDINOSUS GRAFT

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ABSTRACT

Introduction: The anterior cruciate ligament (ACL) is the most commonly reconstructed ligament of the knee. An injury to the ACL can result in significant functional impairment. **Aim:** The aim of the present study is to evaluate results of Arthroscopic ACL Reconstruction using Quadrupled Semitendinosus tendon graft in terms of post-operative level of activity, pain relief and stability of knee joint, to evaluate level of activity before and after the reconstruction surgery and to compare with published report of arthroscopic ACL reconstruction using hamstring tendon graft. **Result:** In the present study, according to the Lysholm scoring system, the functional outcome was 90% excellent results and 10% good results. **Conclusion:** Arthroscopic ACL reconstruction with the quadrupled semitendinosus tendon provides good subjective, functional and stability results in the patients. Post operative rehabilitation is the key to success.

KEYWORDS : Arthroscopic, Anterior Cruciate Ligament, Semitendinosus, Reconstruction, Rehabilitation.

INTRODUCTION

The Anterior Cruciate Ligament (ACL) is regarded as a crucial structure for the knee to function normally. In today's world of motor bikes and active athletic sports, the ACL injury is often come across more frequently. Over the last couple of decades, there has been exponential growth in knowledge regarding the anatomy, biomechanics, epidemiology, graft sources, fixation methods and clinical outcomes of ACL reconstruction.

The most commonly reconstructed ligament in the human body is the anterior cruciate ligament and an injury to it results in significant functional impairment [1,2]

Surgical reconstruction commonly allows return to pre-injury levels of performance [3].

Anterior Cruciate Ligament injury predisposes the knee to degenerative changes as the primary function of Anterior Cruciate to prevent anterior subluxation of tibia relative to the femur is lost. Once injured, the Anterior Cruciate Ligament has a very poor capacity for intrinsic repair. Thus patients often need to undergo ligament reconstruction to stabilize the tibio-femoral joint and restore high level function of the knee joint.

Anterior Cruciate Ligament reconstruction using semitendinosus and gracilis tendons has been advocated as a standard procedure over bone-patellar tendon-bone (BTB) surgery which has disadvantages such as slow recovery in quadriceps muscle strength, difficulties of full hyperextension, and anterior knee pain.

Recent studies showed an improvement in the outcome of ACL reconstruction using semitendinosus and gracilis tendons [4,5].

Similar results have also been obtained with quadrupled semitendinosus alone [6,7]. With the semitendinosus, using the multiple bundle technique and improved fixation with the endo-button made the graft stronger and stiffer. The endo-button made the procedure endoscopic, and eliminated the need for the second incision. Use of bioabsorbable interference screw to fixate the graft at the tunnel entrance produces a graft construct that is strong, short, and stiff [8].

The aims of this study were (1) To evaluate results of Arthroscopic ACL Reconstruction using Quadrupled Semitendinosus tendon grafts in terms of post-operative level of activity, pain relief and stability of knee joint, (2) To evaluate level of activity before and after the reconstruction surgery and (3) Comparison with published report of arthroscopic ACL reconstruction using hamstring tendon graft.

MATERIALS AND METHODS

This prospective study included 30 patients who underwent arthroscopic anterior cruciate ligament reconstruction using quadrupled semitendinosus graft performed at a tertiary care institute and followed up up-to 2 years.

The inclusion criteria were a patient both male and female between the age group of 18 to 50 years having traumatic anterior cruciate ligament tear with or without associated lesions that were identified radiologically or arthroscopically. The diagnosis was made on the basis of following combination of symptoms, signs and radiological and arthroscopic findings of patient's description of giving way sensation or instability at knee, special test for ACL tear positive and MRI and/or arthroscopic evidence of anterior cruciate ligament tear with or without meniscal injury.

The exclusion criteria included patients with any signs of knee joint infection, Tri-compartmental osteoarthritis, inflammatory arthropathy, skeletally immature individuals, multiple ligament injuries and unwillingness of the patient to participate in post-operative rehabilitation.

PREOPERATIVE ASSESSMENT

On visit to OPD or casualty department, detailed history was taken with regard to nature of injury, duration since injury, mechanism of injury, symptoms, associated injury, detail of primary treatment taken and past medical illness. Detailed general and systemic examination was carried out.

Assessment of injured knee with reference to status of skin, swelling, scar, history of aspiration, associated fracture or dislocation and range of motion of knee was done. Special test for knee assessment including lachman test, anterior drawer test, pivot shift test, varus/valgus test, McMurray's test, posterior drawer test was done.

Thus, having arrived at a provisional diagnosis of ACL tear, further investigations were carried out. These investigations include MRI of involved knee to confirm diagnosis and to rule out associated lesion. Radiograph of involved knee –anteroposterior, lateral views for Segond's fracture (i.e chip fracture of lateral condyle of tibia indicating ACL tear). Radiographs also helped to rule out other associated fracture. Other investigations including complete haemogram, ECG, and chest X-ray for anaesthetic fitness.

In acute case of ACL injury, patient were treated conservatively with cylinder slab or long knee brace for about 3 weeks following which ACL reconstruction was planned.

In this study MRI confirmation of ACL injury was done in all patients with diagnostic arthroscopy and ACL reconstruction was carried out at the same time. Associated injury were treated at the same time as ACL reconstruction.

MATERIALS USED:

For arthroscopy:

4.5 mm 30° Arthroscope, Sheath with canula, Arthroscopic camera, Fiber-optic light source and cable, Irrigation system, Arthroscopic burr/shaver, Arthroscopic grasper, punch, 90 degree side cutter, Tibial

guide, Guide wire, Curette, Reamer, Tendon stripper, Graft tensioner, EndoButton and Bio absorbable screw.

Following ACL reconstruction, a standardised rehabilitation program as advocated by Kevin Wilk et al[9] was initiated in all patients.

Functional outcome of all patients were assessed according to Lysholm's scoring scale[10,11] at final follow up.

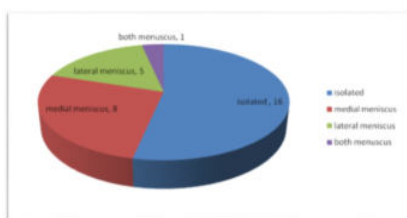
OBSERVATIONS AND RESULTS

In the present study, isolated ACL tear was present in sixteen patients (53%). In eight patients (27%), ACL tear was associated with medial meniscus tear, in five patients (17%), with lateral meniscus tear, and in one patient (3%), with both medial and lateral meniscus tear. (Table-1, Figure-1)

Table 1: Distribution of pathological lesions in the study group

Pathologies associated with ACL tear	No. of Cases	Percentage
Isolated ACL	16	53%
Medial meniscus	8	27%
Lateral meniscus	5	17%
Both medial and lateral meniscus	1	3%

Figure 1: Distribution of pathological lesions in the study group.

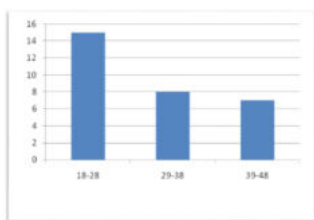


In the present study there were fifteen patients (50%) in the age group 18-29 years, eight patients (27%) in the age group 29-38 years and seven patients (23%) in the age group 39-48. (Table-2, Figure-2)

Table 2: Age distribution of study group

Age Groups	No. of cases
18 - 28	15
29 - 38	8
39 - 48	7

Figure 2: Age distribution of study group.



In this study there were twenty-seven male patients (90%) and three female patients (10%). (Table-3, Figure-3)

Table 3: Gender distribution in the study group

Sex	No.	Percentage
Male	27	90%
Female	03	10%

Figure 3: Gender distribution in the study group.



In this study, sixteen patients (53%) had left sided anterior cruciate ligament tear and fourteen patients (47%) had right sided anterior cruciate ligament. (Table-4, Figure-4)

Table 4: Side distribution in study group

Side of arm	No. of cases	Percentage
Right	14	53%
Left	16	47%

Figure 4: Side distribution in study group

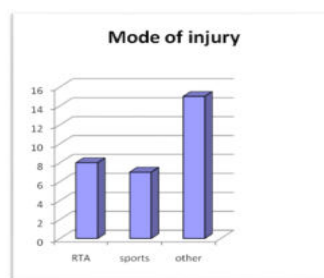


The mode of injury was Road Traffic Accident in eight patients (27%), most commonly in two wheeler driver. Seven (23%) had injury during sporting activity like cricket, kabaddi, football, badminton. Fifteen (50%) patient had injury due to fall due to twisting injury at home, work place, and college. (Table-5, Figure-5)

Table 5: Distribution of mode of injury among the study group

Mode of injury	No. of cases	Percentage
Road traffic accident (RTA)	8	27%
Sports	7	23%
Other	15	50%

Figure 5: Distribution of mode of injury among the study group.

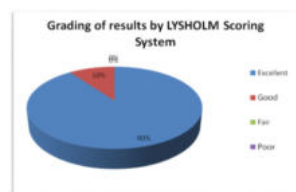


In the present study, as per the Lysholm scoring system, twenty seven patients (90%) had an Excellent outcome, three (10%) had a Good (72-90) outcome; no patient had a Fair or a Poor outcome. (Table-6, Figure 6)

Table 6: Functional outcome of the patients as per the Lysholm score at final follow-up

RESULT	NO. OF CASES	LYSHOLM SCORE	PERCENTAGE
Excellent	27	>90	90%
Good	3	77-90	10%
Fair	0	68-76	0%
Poor	0	<68	0%

Figure 6: Functional outcome of the patients as per the Lysholm score at final follow-up.



DISCUSSION:

Age distribution

15 out of 30 patients, that is 50% are less than 28 yrs and 8 out of 30 patients, that is 27% patient are less than 38 yrs. The mean age at the time of surgery was 30 years (range, 18 to 48 years). This data shows that this type of injury is common in young adults.

Gender distribution

Male predominance was found in this study. There were twenty-seven males and three females. This probably is because males are more frequently involved in sports and road traffic accidents.

Side distribution

Left knee was affected in 16 patient and right knee in 14 patient. There was not much difference in lateralization of the injury.

Time of surgery

This is the interval between the initial symptom of instability and the operative reconstruction. In all acute case of ACL injury, patient were treated conservatively with cylindrical slab or long knee brace for 3 weeks following which ACL reconstruction was planned. During that period patients were started on preoperative ACL rehabilitation program.

Mechanism of injury

The mode of injury was road a road traffic accident in Eight patients (27%), Seven (23%) had injury during sporting activity like cricket, kabaddi, football, badminton. Fifteen (50%) patient had injury due to other causes which include dancing, slip and fall due at home, work place, and college.

We detected no significant difference in the outcomes, as measured by Lysholm knee score, related to whether the left or the right knee was involved, the patient's age, sex, whether the instability occurred following a road traffic accident, fall or sporting injury or the interval between the initial symptom of instability and the operative reconstruction.

Associated injury

Eight patients had an associated medial meniscus tear, five had lateral meniscus tear and one had bilateral tear. 47% of cases have associated meniscal injuries. Out of 14 tear six patients require partial meniscectomy and other require shaving of torn part of meniscus. Patient with concomitant partial meniscectomy had more pain and lower Lysholm score after arthroscopic anterior cruciate ligament reconstruction compare to one with intact menisci.

Kartus JT et al[12] in their multi-center study involving 412 patients, 137 patients underwent concomitant partial meniscectomy and 275 patients had intact meniscus. . Group of patients with concomitant partial meniscectomy had more pain, swelling and laxity than those in group without meniscectomy; they also had a worse classification according to the IKDC system, lower Lysholm scores and a greater proportion of patients with loss of motion.

Type of graft

In this study we use semitendinosus graft and did not sacrificed gracilis tendon with equally good result as that of with semitendinosus and gracilis (STG) tendon combine used. This technique using quadrupled semitendinosus reconstruction has little morbidity, low re-operation rate, and excellent clinical results.

Kang JS et al[13]. 21 patients were prospectively reviewed after ACL reconstruction with quadrupled semitendinosus tendon and Endobutton at one year post-operation. The outcomes showed improved knee functions.

Score

We have used Lysholm scoring for subjective evaluation of the patient at each follow up. At final follow up average Lysholm score was 93.23 at mean follow up of 13.5 months. The Lysholm score showed excellent and good results in all patients. No patient had poor or fair result.

Buchner M, Schmeer T, Schmitt H[14] in their clinical study evaluates for minimum 6 year follow-up clinical, functional, radiological and isometric results after arthroscopic reconstruction of ACL. Seventy operated patients with an average age of 34.3 years could be clinically examined at a mean follow-up time of 6 year. Results revealed a high subjective satisfaction rate of 93%. The preoperative activity level could be maintained in 71% of the patients. The Lysholm score showed very good and good results in 85% with a mean of 83.6%.

Cooley VJ, Deffner KT, Rosenberg TD[7] in their study in 20 ACL reconstructions from April 1990 to February 1992, for follow-up at an average of 5.7 years after surgery activity level was maintained at the pre injury level in nearly half the patients. Isokinetic strength deficits were less than 10%; 17 (85%) of the patients had a normal or nearly normal result as graded by the IKDC scoring system

Meystre JL, Vallotton J, Benvenuti JF[15] in a series of 30 consecutive patients who suffered ACL tear, reconstruction of the torn ACL was performed. At followed up 9-11 years after the operation 96% of the study group considered that they had normal or nearly normal knees,

and 81% had recovered to the same sports activity level as before their injury.

Implant use

In this study we use EndoButton for femoral fixation and bioabsorbable screw for tibial fixation ACL reconstruction procedure is efficient in restoring a satisfactory stability for patients and stabilises the evolution of the degenerative lesions. In our study satisfactory stability restore in most of our patient.

Chen L, Cooley V, Rosenberg T[16] in their study used technique of quadrupled semitendinosus autograft for ACL reconstruction using the EndoButton for femoral fixation and used this technique for over 10 years with no known instance of fixation failure at the femur or tibia.

In this study, of the 30 patient assessed at final follow up all patient had full range of motion except one, who had flexion of about 100 degree, as patient was given a above knee cast for 1month in other hospital before coming to us .

In this study 2 patients had 1+laxity on anterior drawer test. These patients had no instability while walking, running, climbing down stair. All other patients had negative anterior drawer and Lachman test. Pivot shift test was negative in all patients.

All patients can do one leg hop test comfortably.

In this study although there was decreased hamstring strength initially, there was not much difference in the strength index of hamstrings at final follow up.

Complication

None of the patient in our study had major complication following surgery. One patient had gapping of wound on 12 post operative dressing which heal on follow up dressing. One patient had history of twisting injury about 22 month after ACL reconstruction but had no problem on final follow up.

CONCLUSION

The anterior cruciate ligament injures are common in young active persons, especially those who are into rigorous athletic activity Arthroscopy is valuable tool in diagnosis of ACL ruptures and associate joint pathology.

The primary goal of reconstruction of ACL is to restore stability to knee and thereby to restore its function and allow the patient to return to normal activities including sports.

Arthroscopic ACL reconstruction with the quadrupled semitendinosus tendon provides excellent and good subjective, functional and stability results in the patients.

This technique using quadrupled semitendinosus tendon reconstruction has little morbidity, low re-operation rate, and excellent clinical results.

Associated meniscal pathology significantly affects the final outcome and Post-operative rehabilitation is the key to success.

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