



POST-OPERATIVE COMPLICATIONS FOLLOWING ARTHROSCOPIC ACL RECONSTRUCTION USING VARIOUS GRAFTS; A PROSPECTIVE STUDY

Orthopaedics

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ABSTRACT

Anterior cruciate ligament tear is a common occurrence and with advent of arthroscopic ligament reconstruction, the surgery is minimally invasive with good functional outcomes. The aim of this study is to evaluate the post-operative complications following arthroscopic ACL reconstruction. In this study we tried to analyse the post-operative complications in patients with arthroscopic ACL reconstructions using various autografts. The autografts used in this study were Bone patellar tendon bone graft, hamstring graft and peroneus graft. 26 patients were included in the study. 2 patients lost to follow up. The study result comprised of 24 patients, there were 45.8% of the patients who were below the age of 25 years whereas 54.2% patients were older than 25 years. Only 3 females were recruited in the present study, accounting for 12.5% of the total patients of the study. Majority 87.5% were males. Majority of the recruited patients were having right sided knee injury (54.2%) whereas remaining (45.8%) were having left sided injury. Majority of the patients were treated using hamstring and peroneus grafts (41.7%). 16.7% patients were treated with BPTB graft. There were 16.7% patients who developed deep infection after the surgery. Out of these, 30% were with hamstring grafts and 25% were with BPTB graft. 41.7% patients didn't develop any complications afterwards. 12.5% patients complained of post-operative knee pain. 16.7% patients reported occurrence of superficial infection. There are no significant differences among complications for different grafts used in this study. The study concluded that arthroscopic ACL reconstruction is a safe surgical procedure with no significant differences for various autograft options in terms of complications. The study is limited by small sample size and short follow up.

KEYWORDS

ACL tear, Arthroscopic ACL reconstruction, Bone patellar tendon bone graft, Hamstring graft, Peroneus graft, Post-operative knee pain, stiffness, superficial infection, deep infection

INTRODUCTION:

Anterior Cruciate Ligament (ACL) injury is the most controversial ligamentous injury and has been studied extensively all over the world in the past 20 years. The Anterior Cruciate Ligament is the weaker of the two cruciate ligaments and therefore maybe it tears easier than the Posterior Cruciate Ligament (Moore KL 1984)¹. Ideally, a graft used for surgical ACL reconstruction should be one that, as far as possible, recreates the anatomical and biomechanical properties of the native ligament, that guarantees safe fixation, and that provides rapid biological integration, reducing recovery time and donor site morbidity (Cerulli G et al 2013)². Arthroscopically assisted Anterior Cruciate Ligament Reconstruction has the advantage of being minimally invasive, accurate graft placement, less disturbance of normal tissue resulting in quicker recovery and rehabilitation, minimal hospital stay and very less infection rate.

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. Anterior Cruciate Ligament Reconstruction has been attempted using Silver wire (Corner EM et al 1914)³, Fascia Lata (Hey-Groves EW 1920)⁴, and Iliotibial band. To date more than 400 different techniques have been described for Anterior Cruciate Ligament Reconstruction from open to arthroscopic technique (Strobel MJ 1998)⁵.

The bone- patellar tendon- bone is the most commonly used graft in ACL reconstruction. However, concerns regarding problems with the extensor mechanism of the knee, loss of motion, patella infra, patellar fracture and the development of chronic anterior knee pain have promoted surgeons to seek other graft materials for use in ACL reconstruction. As such, the semitendinosus and Gracilis tendon represent an alternative autograft donor material that may be used for reconstruction of the ACL without disturbance of the extensor mechanism.

Stiffness is a common post-ACL reconstruction complication that is defined as the incomplete range of motion of the knee following

surgery. The complication may be a result of poor technique during surgery or due to poor adherence to post-operative rehabilitation protocol. Aggressive rehabilitation, manipulation under anaesthesia, arthroscopic adhesiolysis may be used to relieve knee stiffness.

Pain, swelling, redness, the rise of temperature, and stiffness may occur as a result of infection. Radiological and knee aspirate and cultures may be needed for diagnosis. The infection may be managed with thorough lavage, antibiotics, debridement, etc. The management may at times necessitate the removal of the graft.

Pain in the front of the knee after the surgery is commonly associated with patellar tendon graft but may also occur in cases of allograft and quadriceps tendon graft. The pain may occur due to non-compliance with postoperative rehabilitation protocol.

The present study was aimed to study post-operative complications following arthroscopic ACL reconstruction using various grafts with the follow-up up to 6 months.

MATERIAL AND METHODS:

The study was conducted after approval from ethics committee of our institute. Patients presenting with acute knee pain due to any knee pathology in the age group greater than 18 years of either gender were included in the study after confirmed diagnosis and informed consent.

26 patients with acute cruciate ligament tear meeting the inclusion and exclusion criteria operated from May 2018 to May 2020 were included. 2 patients lost to follow up and hence study group consisted of 24 patients.

All skeletally mature patients with anterior cruciate ligament tear confirmed by Lachman test with concomitant meniscal injury that required repair were included in the study, provided that they were permitted to undergo rehabilitation after Anterior Cruciate Ligament reconstruction involving full weight-bearing gait and unrestricted non-weight bearing range of motion.

An elaborate history was taken from all the patients which was

followed by a thorough clinical evaluation, in which duration of symptoms, affected side, dominant knee, range of movement was noted. A thorough medical history, nature of complaints, symptoms, and signs were noted. In case of an injury being the cause of knee pain, cause of injury was also noted. Patients were subjected to X-ray, MRI as initial investigation. On viewing, the X-ray and MRI, Patients were planned for arthroscopic ACL reconstruction procedure under spinal anaesthesia. Grafts used were autografts. Bone patellar tendon bone grafts, hamstring graft and peroneus grafts were used.

Post-operative rehabilitation protocols were followed and patients were evaluated for immediate and long-term complications on follow up.

RESULTS:

The current study enrolled a total of 26 patients to study post-operative complications following arthroscopic ACL reconstruction by various grafts with the follow-up up to 6 months. 2 patients lost to follow up and hence total of 24 patients were evaluated.

There were 45.8% of the patients who were below the age of 25 years whereas 54.2% patients were older than 25 years. Only 3 females were recruited in the present study, accounting for 12.5% of the total patients of the study. Majority 87.5% were males. Majority of the recruited patients were having right sided knee injury (54.2%) whereas remaining (45.8%) were having left sided injury.

Table 1: Distribution according to Graft Type

Graft Type	Frequency	Percent
BPTB	4	16.7
Hamstring	10	41.7
Peroneus	10	41.7
Total	24	100.0

While treating the patient, there was grafting done using various graft types. As shown in table 14, majority of the patients were treated using hamstring and peroneus grafts (41.7%). 16.7% patients were treated with BPTB graft.

Table 2: Comparing Complication between graft types

			Graft Type			Total
			BPTB	Hamstring	Peroneus	
Complication	Deep infection	Count	1	3	0	4
		%	25.0%	30.0%	0.0%	16.7%
	None	Count	2	2	6	10
		%	50.0%	20.0%	60.0%	41.7%
	Post op knee pain	Count	1	2	0	3
		%	25.0%	20.0%	0.0%	12.5%
	Stiffness	Count	0	1	2	3
		%	0.0%	10.0%	20.0%	12.5%
	Superficial infection	Count	0	2	2	4
		%	0.0%	20.0%	20.0%	16.7%

Table no 2 shows the rate of complications observed in the patients. There were 16.7% patients who developed deep infection after the surgery. Out of these, 30% were with hamstring grafts and 25% were with BPTB graft. 41.7% patients didn't develop any complications afterwards. 12.5% patients complained of post-operative knee pain. 16.7% patients reported occurrence of superficial infection.

STATISTICAL ANALYSIS:

Anova: Two-Factor Without Replication

SUMMARY	Count	Sum	Average	Variance
Deep infection	3	4	1.33	2.33
Post op Knee pain	3	3	1.00	1.00
Stiffness	3	3	1.00	1.00
Superficial Infection	3	4	1.33	1.33
None	3	10	3.33	5.33
BPTB	5	4	0.80	0.70
Hamstring	5	10	2.00	0.50
Peroneus	5	10	2.00	6.00

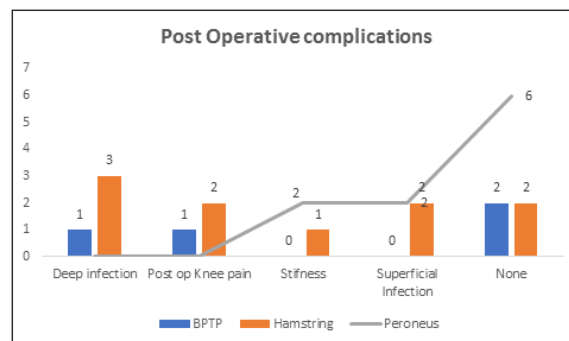
Source of Variation	SS	df	MS	F	P-value	F crit
Rows	11.6	4	2.9	1.348837	0.332177	3.837853
Columns	4.8	2	2.4	1.116279	0.373614	4.45897
Error	17.2	8	2.15			
Total	33.6	14				

$\alpha=0.05$

STATISTICAL INFERENCES:

For rows: F (1.348837) value is less than F Critical (3.837853), and p value (0.332) is greater than alpha (0.05), hence fail to reject the null hypothesis. Hence, there is no significant difference among "Deep infection", "Post op Knee pain", "Stiffness", "Superficial Infection" and "None"

For Columns: F (1.116279) value is less than F Critical (4.45897), and p value (0.373) is greater than alpha (0.05), hence fail to reject the null hypothesis. Hence, there is no significant difference among "BPTB", "Hamstring", and "Peroneus".



Graph 1: Post-operative complications

DISCUSSION

Due to the increased occurrence of Road Traffic Accidents and increased number of persons participating in sports activities, the number of ACL reconstructions being done has been increased. Arthroscopic reconstruction of the injured ACL has become the gold standard and is one of the most common procedures done in orthopaedics and thus it has been extensively studied and outcomes of ACL reconstruction have gained considerable attention.

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.

Among these, the most commonly used are the Bone patellar tendon bone graft and hamstring graft. The advantages of Bone patellar tendon bone graft include high ultimate tensile load (approximately 2300 N) and a rigid fixation due to its bony ends.

In the present study, there were 16.7% patients who developed deep infection after the surgery. Out of these, 30% were with hamstring grafts and 25% were with BPTB graft. 41.7% patients didn't develop any complications afterwards. 12.5% patients complained of post operative knee pain. 16.7% patients reported occurrence of superficial infection.

There are no significant differences among complications for different grafts used in this study. The study concluded that arthroscopic ACL reconstruction is a safe surgical procedure with no significant differences for various autograft options in terms of complications.

Andres Cano P et al in 2014 did a study for postoperative complications of arthroscopic anterior cruciate ligament (ACL) reconstruction performed as an outpatient compared with same surgery performed as a regular admission (inpatient). Pain not controlled with analgesia (6.7%), hemarthrosis that required arthrocentesis (4.4%), fever (3.2%), deep vein thrombosis (0.6%), cellulitis (0.6%), septic arthritis that required arthroscopic debridement (0.3%), and others (1.2%) including problems with immobilization. The hospital readmissions (2.3%) were for surveillance and monitoring of the surgical wound. In the bivariate analysis no statistically significant differences were found between groups as regards the sociodemographic characteristics of the patients or the complications recorded⁶.

Crawford DC et al concluded that Complications were associated with larger graft diameter in comparison to patients who experienced no complication (9.0+/-1.2 mm v. 8.4+/-1.0 mm, p=0.005)⁷.

PT autografts resulted in increased anterior knee pain and kneeling

pain compared with HS autografts. (Xie X 2015)⁸ In some studies, PT reconstructed knees experienced a greater incidence of anterior knee pain and radiographic evidence of degenerative change, and in others, HS autograft reconstructed knees had increased laxity and less flexion strength. (Ciccotti MC 2017)

CONCLUSION

Based on the present study findings we can conclude that ACL reconstruction was more common in the patients who were older than 25 years and were mainly men. Right sided knee injury was most common among those who were engaged in the sports activities. There are no significant differences among complications for different grafts used in this study. The study concluded that arthroscopic ACL reconstruction is a safe surgical procedure with no significant differences for various autograft options in terms of complications. The study is limited by small sample size and short follow up.

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