



E-ISSN: 2395-1958  
P-ISSN: 2706-6630  
IJOS 2021; 7(1): 284-287  
© 2021 IJOS  
[www.orthopaper.com](http://www.orthopaper.com)  
Received: 07-11-2020  
Accepted: 15-12-2020

**Dr. Somashekar**  
Professor, KIMS Bengaluru,  
Karnataka, India

**Dr. Santosh Kumar**  
Assistant Professor, KIMS  
Bengaluru, Karnataka, India

**Dr. Ragha Midhun Ponnamm**  
3rd year Junior Resident, KIMS  
Bengaluru, Karnataka, India

**Dr. Kiran Kumar**  
Assistant Professor, KIMS  
Bengaluru, Karnataka, India

## Arthroscopic ACL reconstruction-functional outcome with BPTB graft with interferential screws

**Dr. Somashekar, Dr. Santosh Kumar, Dr. Ragha Midhun Ponnamm and Dr. Kiran Kumar**

DOI: <https://doi.org/10.22271/ortho.2021.v7.i1e.2499>

### Abstract

**Background:** Anterior cruciate ligament (ACL) tear is the most common serious ligamentous injury to the knee joint. The ACL is the primary stabilizer against anterior translation of the tibia on the femur and is important in counteracting rotation and valgus stress. Anterior cruciate ligament deficiency leads to knee instability. This results in recurrent injuries and increased risk of intra articular damage, especially the meniscus. The goals of the ACL reconstruction are to restore stability to the knee, allow the patient to return to normal activities, including sports and to delay the onset of osteoarthritis. The bone patellar tendon bone graft is one of the most commonly used autograft for reconstruction and this study evaluates the functional outcome in a prospective study.

**Materials and Methods:** This was a prospective study comprised of 30 diagnosed cases of ACL tear confirmed by clinical evaluation, MRI scanning and diagnostic arthroscopy in patients who have come with complains of knee instability/pain to KIMS hospital and research centre from February 2018 to February 2019. Patients between the age groups 18 years to 40 years were taken as test subjects and were managed by arthroscopic ACL reconstruction with BPTB graft and interferential screw and were followed for an average period of 8 months and the findings were recorded and compared pre op and post op using IKDC and Lysholm scoring scales.

**Results:** There were significant improvements in IKDC and LYSHM scores and functional outcome of patients before and after the operation. During the average follow-up period, 100% of patients had varying degrees of symptomatic relief. No patient needed any additional modality of treatment or reoperation for recurrence of symptoms.

**Keywords:** Anterior cruciate ligament, international knee documentation committee (IKDC), lysholm, bone patellar tendon bone graft

### Introduction

In the present world, high velocity road traffic accidents <sup>[1]</sup>, sports activities and increased fitness awareness, ACL injuries are a common clinical problem. Once upon a time ACL rupture led to a relatively safe existence and was thought to be of not much significance <sup>[2]</sup>. Through time, with improved knee kinematics and clinical skills, it has been established that post ACL injury, the prevalence of clinically significant meniscal damage increases with time and is associated with increasing disability and early osteoarthritis of the knee joint. Ligament reconstruction has not been shown to prevent arthrosis, but studies show that it appears to reduce the risk of early arthritis of the knee joint, subsequent meniscal injury and improve anteroposterior knee motion and facilitates return to high level sporting activities.

Over the past 20 years. ACL has been studied as much as any orthopaedic structure research in anatomy, biomechanics, epidemiology, graft sources, fixation methods and clinical outcomes of ACL and its reconstruction has lead to an extensive understanding of this ligament as well as the ability to consistently and predictably reconstruct it <sup>[3]</sup>.

As with many orthopaedic procedures. There is more than one way, when it comes to ACL reconstruction. An understanding of the anatomy, adherence to sound biomechanical principles and appropriate rehabilitation programmes ensures good results along with the choice of a particular graft or fixation methods.

Also important is the increasing knowledge of the biomechanics of the potential for long term damage depending on the activity level.

**Corresponding Author:**  
**Dr. Ragha Midhun Ponnamm**  
3rd year Junior Resident, KIMS  
Bengaluru, Karnataka, India

As surgical techniques like Arthroscopy improve the ability to tackle complex problems [4], complex decisions regarding Meniscal repair and transplantation, Cartilage repair and regeneration are now common place, as are decisions regarding the need for Osteotomies in Arthritically unstable knees.

The ideal graft for ACL reconstruction should reproduce the complex anatomy of ACL, provide the same biomechanical property as the native ACL, permit strong and secure fixation, promote rapid biological incorporation.

Arthroscopic reconstruction of the Anterior Cruciate Ligament with patellar bone - tendon - bone graft is minimally invasive and is relatively quick and simple to perform, although attention to detail as required for good results. Thus arthroscopy helps in diagnosis and treatment of internal derangement and on extra articular reconstruction. Thus this procedure consists of a combined procedure of arthroscopy for diagnosis and treatment of internal derangement and an extra articular reconstruction by means of bone-patellar tendon-bone graft by minimally invasive, quick and simple surgery. Although attention to detail is required for good results [5].

**Aims and Objectives**

To do detailed functional outcome of arthroscopic ACL repair by bone patellar tendon bone graft with interferential screws.

**Materials and Methods**

During the period February 2018 to February 2019, 30 cases diagnosed with anterior cruciate ligament tear were surgically treated at our institution using BPTB graft. This is a prospective analysis of the 20 consecutively treated cases. 6 Months of minimum follow up. All patients provided written & informed consent prior to procedure, and every clinical test and surgeries were directed by the standards of the Declaration of Helsinki.

The inclusion and exclusion criteria for the study are as follows.

**Inclusion Criteria**

- Age group: 18 – 40 years,
- Old ACL rupture with anteroposterior instability,
- Acute ACL rupture.

**Exclusion Criteria**

- ACL rupture with Bony Avulsion,
- Age; <20 years&>40 years.
- ACL rupture associated with pre-existing secondary OA in 20 – 40 yrs age group.
- ACL rupture associated with Condylar Fractures of the Tibia.

**Table 1:** 50% of the patients were in the age group 21 to 30 years, 40% over 30 years and 10% of the patients below 20 years.

		Count	%
Age	<20 years	3	10.0%
	21 to 30 years	15	50.0%
	>30 years	12	40.0%
	Total	30	100.0%

**Surgical procedure**

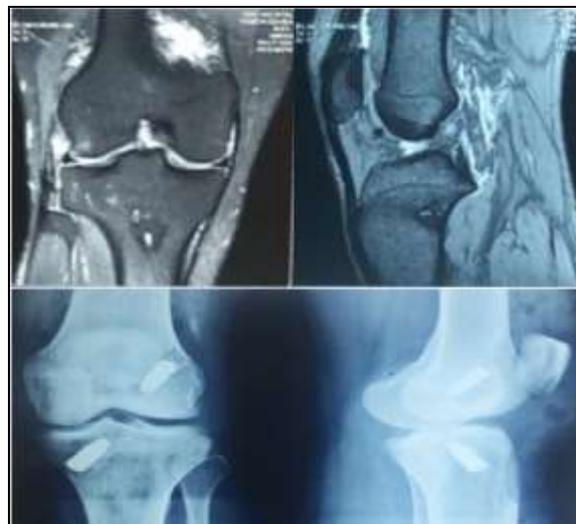
All the 20 patients have underwent a two incision arthroscopic reconstruction using BPTB graft under spinal/general anaesthesia.

The knee joint was assessed clinically on the operating table

and the ACL tear was confirmed arthroscopically. The ruptured ACL stump is resected and trimmed and the bone patellar tendon bone graft is harvested. The affected knee is examined arthroscopically to evaluate damage to other articular structures and mark the isometric entry point in the femoral tunnel. The tibial tunnel and the femoral tunnel are prepared.

The harvested graft is applied and fixed with round headed cannulated interference screws into position.

The per-operative findings were recorded in the proforma



**Fig 1:** a & b show the complete ACL tear in the MRI; C shows the AP and lateral view of the post Op X-Rays

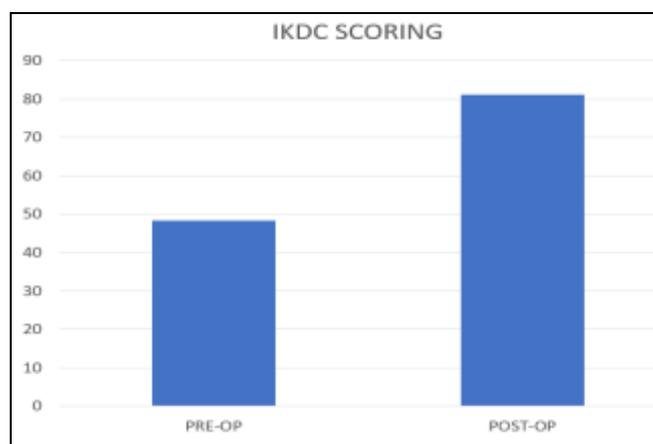
**Rehabilitation protocol**

Static Quadriceps and Static hamstring exercises are started immediately the next post-operative day. Full weight bearing was allowed on 3 weeks with complete range of motion exercise.

**Follow-up**

All the cases were regularly followed up at 3 weeks, 6 weeks, 12 weeks and 24 weeks and the patients were assessed and the findings were recored in the proforma.

**Results**



**Fig 2:** Bar diagram showing IKDC score comparison at Pre and Post surgery

The pre operative mean IKDC scoring was 49.2 and at 6 months follow up the mean IKDC scoring was significantly improved to 81.1.



**Fig 3:** Bar diagram showing LYHM score comparison at Pre and Post surgery

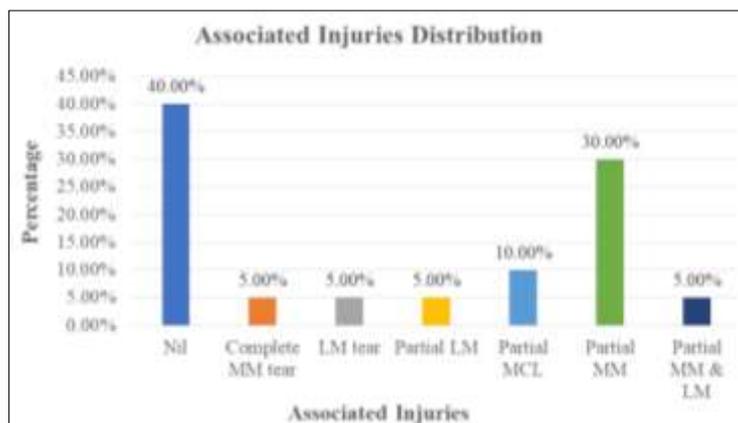
The pre operative mean LYSHM scoring was 62.2 and at 6 months follow up the mean LYSHM scoring was significantly improved to 90.1

**Table 2:** Range of motion-flexion assessed at 6 months follow up

Range on Motion	Number (n=30)	%
Up to 100	2 (6.7%)	6.7%
100-120	25 (83.3%)	83.3%
120-140	3(10.0%)	100%
Inference	73.3% of the patients had good ROM-flexion (>100) with 95% CI (78.68-98.15%)	

**Table 3:** Range of motion-extension assessed at 6 months follow up

Range on Motion	Number (n=30)	%
Extension lag	-	-
Full Extension	30	100.0
Inference	100.0% of the had full extension.	



**Fig 4:** In the study 5% had Complete MM tear, LM tear, Partial LM tear, Partial MM & LM respectively, 10% had partial MCL tear and 30% had partial MM tear.

## Discussion

ACL injuries were once considered to be career ending. These days, they are often a mere blip in an athlete's career path and surgical reconstruction commonly allows a return to pre-injury levels of performance.

As with many orthopaedic procedure, there is more than one way for performing ACL reconstruction. An understanding of the anatomy, adherence to sound biomechanical principles and appropriate rehabilitation programs ensure good results more so than the choice of a particular graft or fixation method.

The ACL is the primary restraint to anterior translation of the tibia relative to the femur and the secondary restraint to internal rotation with the knee in extension [6,7].

The ideal graft for ACL reconstruction should reproduce the complex anatomy of the ACL, provide the same biomechanical property as the native ACL, permit strong and secure fixation, promote rapid biological incorporation and minimize donor site morbidity.

The bptb graft have consistently provided excellent stability than the native ACL, biomechanically stronger (2900N/mm) and structurally stiffer (685N/mm). Fixation with interference screws within the bone tunnels provides initial pullout strength of 640 N with rapid bone to bone healing, this

fixation method exceeds the 454 N that Noyes [8], et.al calculated as being necessary for normal physical activity and results in a graft that closely approximates the physiological length of the ACL. Overtime the graft incorporated into the bone tunnels, resynovializes and revascularizes intra-articularly and provides long term stability.

Although the donor site morbidity remains the most limiting factor of BPTB tendon [9], it is still one of the popular choice of graft due to excellent tensile strength, larger graft diameter, maintenance of the extensor mechanism of the knee and the shorter healing time with integration of the graft inside the tunnels due to the bone plugs [10,11].

One/two incision arthroscopic ACL reconstruction has become the procedure of choice because of its reduced post operative morbidity, shorter operating time and improved cosmetics. Further more faster post-operative improvement in dynamic muscle function has been documented. Using a patellar tendon autograft, this procedure is consistently reproducible as long as there is meticulous attention to detail. A clear understanding of the critical stages of the arthroscopic ACL reconstruction and the knowledge of the potential pitfalls can help to avoid complications and produce consistently excellent results.

PARAMETER	SCORE 0 (NOT SATISFIED)	SCORE 1 (MINIMALLY SATISFIED)	SCORE 2 (SATISFIED)	SCORE 3 (REMARKABLY SATISFIED)
ARE YOU HAPPY WITH THE OPERATION?			05	15
ARE YOU RELIEVED OF GIVING AWAY SENSATION & PAIN?			07	13
CAN YOU WALK BETTER?				20
WOULD YOU RECOMMEND THE OPERATION TO SOMEONE?			04	16

## Conclusion

Our clinical study results showed that arthroscopically assisted Anterior Cruciate Ligament reconstruction using BPTB graft with two incision techniques gives good ligament stability and function of the knee joint and return of the patient to their pre-injury level of activities.

This technique is minimally invasive, satisfactory results were observed, restriction of 10<sup>0</sup>-20<sup>0</sup> of terminal range of flexion of the knee was observed, which recovered with physiotherapy & rehabilitation, there was no extension lag in any of the cases indicating that the surgeon must be well trained in the procedure of arthroscopy and rehabilitation protocol is maintained.

In our study, we had more of male patients probably due to a more active life style and common usage of high velocity vehicles by males in our country.

## References

1. Quinter Burnett M, Peter Fowler J. Orthopaedic clinics of North America 1985;16:1.
2. Quinter Burnett M, Peter Fowler J. Reconstruction of the ACL – Historical review Orthopaedic clinics of North America 1985;16:4.
3. James Gladstone N, James R. Andrews Orthopaedics Clinics of North America, Preface on ACL reconstruction 2002;3:4.
4. Andrews JR, Sanders R. A one incision reconstruction technique in treating antero lateral rotatory instability.
5. Robert W, Sydnor MD, James Andrews R. M.D OCNA, Col 1985;16:2.

6. Beynonn BD, Johnson RJ. Elevant biomechanics. In: DeLee JC, Drez D, editors, orthopaedic sports medicine. Philadelphia: WB Saunders 1994, 1113-33.
7. Butler DL. ACL: Its normal response and replacement. Jorthop Res 1989;7:910-21.
8. Noyes FR, Butler DL, Grood ES *et al.* Biomechanical analysis of human ligament grafts used in knee ligament repair and reconstruction. Journal of Bone and Joint Surgery 1984;66A:344-352.
9. Canale Terry S, Kay Daugherty, Linda Jones (Ed). Campbells Operative Orthopaedics. St. Louis: Mosby 1998, 1155.
10. Canale Terry S, Kay Daugherty, Linda Jones (Ed). Campbells Operative Orthopaedics. St.Louis: Mosby 1998, 1528.
11. Jackson DW, Jennings LD. Arthroscopically assisted reconstruction of the anterior cruciate ligament using a patellar tendon bone autograft. Clin sports med 1988;7:785-800.