

FUNCTIONAL OUTCOME OF ARTHROSCOPICALLY ASSISTED ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION USING PATELLAR BTB GRAFT: A PROSPECTIVE STUDY OF 45 CASESI. Suresh¹, R. Yatish², J. N. Sridhara Murthy³, Ravish V. N⁴, Somashekar⁵, Vinod A. C⁶**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: In today's world high velocity road traffic accidents, sports activities and increased fitness awareness, ACL injuries is a common clinical problem. Once upon a time ACL rupture led to a relatively safe existence and was thought to be of less significance. Now 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 arthrosis. Ligament reconstruction has not been shown to prevent arthrosis, but studies show that it appears to reduce the risk of subsequent meniscal injury and improve anteroposterior knee motion and facilitates return to high level sporting activities. As surgical techniques like Arthroscopy improve the ability to tackle complex problems, complex decisions regarding Meniscal repair and transplantation, Cartilage repair and regeneration are now commonplace, as are decisions regarding the need for Osteotomies in Arthritically unstable knees. 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.

KEYWORDS: ACL injuries, arthroscopy, patellar bone - tendon - bone graft.

INTRODUCTION: Ligament reconstruction has not been shown to prevent arthrosis, but studies show that it appears to reduce the risk of 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 orthopedics structure Research in Anatomy, Biomechanics, Epidemiology, Graft sources, fixation methods and clinical outcomes of ACL and it's reconstruction has led to an extensive understanding of this Ligament as well as the ability to consistently and predictably reconstruct it.¹

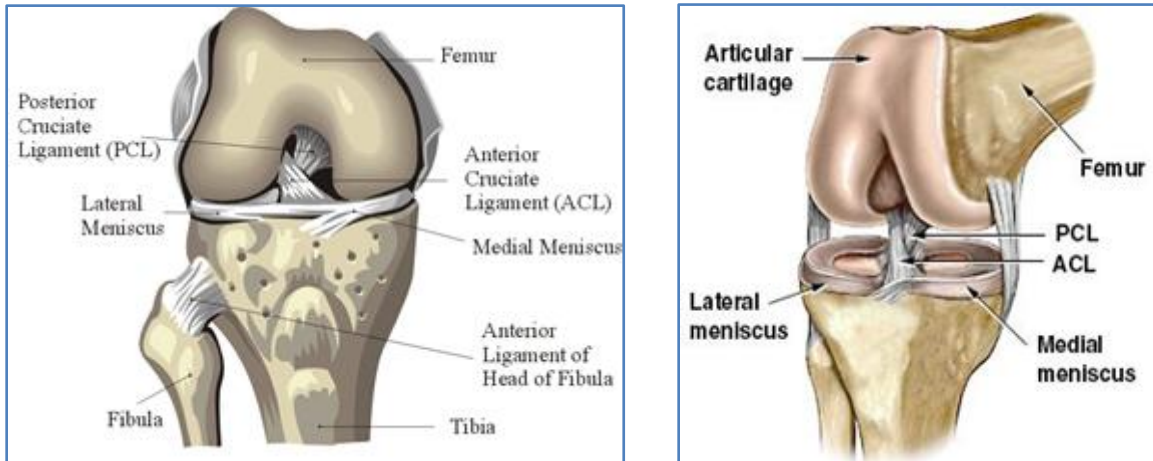
As with many orthopedic procedures, there is more than one way, when it comes to ACL reconstruction. An understanding of the Anatomy, adherence to sound Biomechanical principles and appropriate rehabilitation programmes ensures good results – more so than the choice of a particular graft or fixation method.

Also important is the increasing knowledge of the Biomechanics of the potential for long term damage, or lack thereof, depending on the activity level.

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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 extra articular reconstruction.²

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.



Structures of the knee joint

MATERIAL & METHODS: The clinical material for the study of arthroscopically assisted Anterior Cruciate Ligament reconstruction by Bone-Patellar Tendon-Bone graft consists of 45 cases of fresh & chronic ACL rupture of traumatic etiology meeting the inclusion criteria & exclusion criteria, admitted to KIMS Hospital between July 2006 to July 2013.

Inclusion Criteria:

- Age group: 20 – 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.

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OPERATIVE PHOTOS



Fig. 1: Patient positioning on fracture



Fig. 2: Incision for harvesting BTB



Fig. 3: BTB graft being harvested.

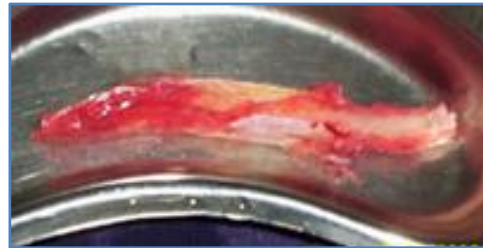


Fig. 4: Harvested BTB graft



Fig. 5: SS wire leads in the bone



Fig. 6: arthroscopic assisted reaming for BTB graft placement

RESULTS: One/ two incision endoscopic ACL reconstruction has become the procedure of choice because of its reduced post-operative morbidity, shorter operating time and improved cosmesis.

Furthermore faster post-operative improvement in dynamic muscle function has been documented. Using a patellar tendon auto-graft, this procedure is consistently reproducible as long as there is meticulous attention to detail.

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A clear understanding of the critical stages of arthroscopic ACL reconstruction and the knowledge of the potential pitfalls can help to avoid complications and produce consistently excellent results.

Study Design: A Prospective clinical study consisting of 45 orthopedic patients is undertaken to evaluate the ROM and other clinical features.

In our study 22 patients were in 20 – 25 years, 23 patients were in 26 – 40 years age group. The main mode of injury was RTA in 30 cases, sports injury in 7 cases, and fall in 8 cases.

Instability	Number	%
Ant. Lat	13	29.0
Ant. Med	32	71.0
Inference	71.0% of the patients had Ant. Med instability with 95 % CI (52.12-83.34%), which is statistically significant.	

Table 1: Instability

Complications	Number	%
Nil	43	96.0
Present	2	4.0
Inference	96.0% of the patients did not have any complications with 95% CI (78.68-98.15%), which is statistically significant.	

Table 2: Complications

Graft site tenderness	Number	%
Nil	34	75.0
+	8	17.7
++	2	4.0
+++	1	2.0
Inference	75.0% of the patients did not have any Graft site tenderness with 95% CI (55.55-85.82%), which is statistically significant.	

Table 3: Graft site tenderness

IKDC	Number	%
≤50	3	6.7
51-70	18	36.7
71-90	18	36.7
>90	6	20.0
Inference	56.7% of the patients had IKDC score of >70 in the present study	

Table 4: IKDC

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Range on Motion	Number (n=30)	%
Up to 100	4 (6.7%)	6.7%
100-120	35 (83.3%)	83.3%
120-140	6(10.0%)	100%
Inference	73.3% of the patients had good ROM-flexion (>100) with 95% CI (78.68-98.15%)	

Table 5: Range of Motion-Flexion

CI confidence interval

Range on Motion	Number (n=45)	%
Extension lag	-	-
Full Extension	45	100.0
Inference	100.0% of the had full extension.	

Table 6: Range of Motion-Extension

Statistical Methods: 95% confidence intervals are computed to find the significance of proportion of study parameters.

1. 95% Confidence Interval:

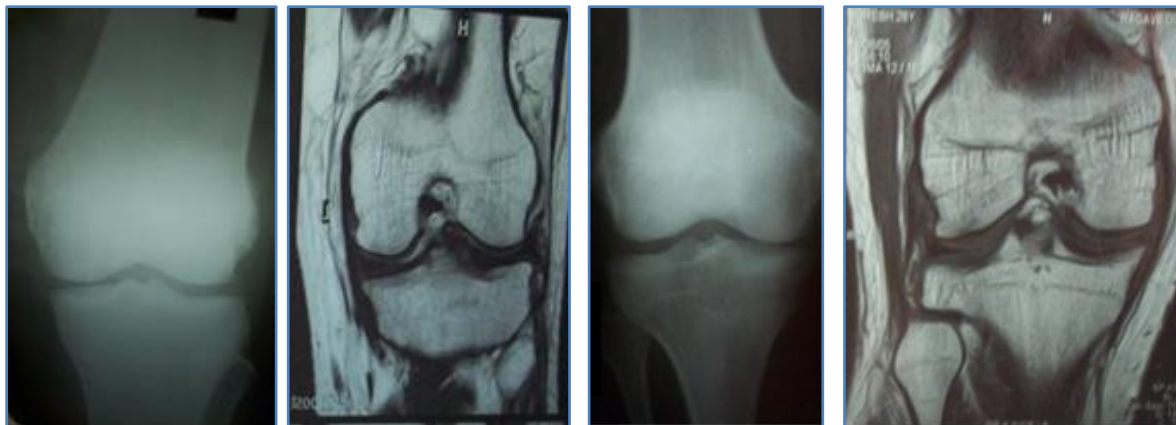
$P \pm 1.96 * SE (P)$, Where SE (P) is the Standard error of proportion = $P*Q/\sqrt{n}$

2. Significant figures

+ Suggestive significance $0.05 < P < 0.10$

* Moderately significant $0.01 < P \leq 0.05$

** Strongly significant $P \leq 0.01$



Pre-op X rays and MRI of patients with ACL affected knee



Post Op X-rays

DISCUSSION: Graft selection for ACL reconstruction has continued to challenge the orthopedic surgeon because of the tremendous biomechanical requirements placed on the normal ACL.

Partly because of the work of Noyes et al³ regarding relative graft strengths, the patellar tendon has become the most commonly used graft for autogenous ACL construction. The patellar tendon has been chosen because of its strength and bone to bone fixation. The healing option of maintaining the blood supply to the graft and the test of surgical exposure to the graft and cruciate ligament are also factors.⁴⁻⁷ Rarely has patellar tendonitis been reported after patellar tendon harvest.⁸

The bone patellar tendon bone auto graft has been labeled the “gold standard” for ACL reconstruction⁹. The advantage of arthroscopically assisted reconstruction of the anterior cruciate ligament¹⁰ is that there is minimum injury to the capsule and synovial membrane of the joint, yet the goals accomplished by open operative techniques can be achieved. The theoretical advantages of no arthrotomy include less injury to the patella femoral mechanism and, possibly, less frequent symptoms and contractures of the patella femoral joint post operatively. It is also our impression that the proper sites for the locations of the bone tunnels can be identified better when an arthroscope is used. In addition, the correct relationship of the graft with respect to the lateral wall of the inter condylar notch can be established.

The central one-third of the patellar ligament was chosen as the graft because of its excellent biomechanical properties¹¹, the fact that it can be secured rigidly in position, and the previous results after open reconstruction of the patellar ligament.^{12,13}

CONCLUSION: Our clinical study results showed that arthroscopically assisted Anterior Cruciate Ligament reconstruction using BPB 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 10⁰-20⁰ 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.

BIBLIOGRAPHY:

1. Gladstone J.N, Andrews J. R. Preface- Anterior cruciate ligament reconstruction. *Orthop Clin N Am.* October 2002: 33 (4): ix-x
2. Andrews JR, Sanders R. A "mini-reconstruction" technique in treating anterolateral rotatory instability (ALRI). *Clin Orthop Relat Res.* 1983 Jan- Feb: (172): 93-6.
3. Noyes F.R, Butler D. L., Grood E. S. et al. Biomechanical analysis of human ligament grafts used in knee ligament repair and reconstruction. *J Bone Joint Surg Am.*1984 march: 66 (3): 344-352
4. Ross FR, Butier DL, Grood ES, et al Biomechanical analysis of human ligament, grains used in knee-ligament repairs and reconstructions. *J. Bone Joint Surg.* 66A, 344-352, 1984.
5. Cancy WG Jr, Nelson DA Reider B et al, Anterior cruciate ligament reconstruction using one-third of the patellar ligament, augmented by extra articular tendon transfers, *J. Bone Joint Surg.* 64A, 352-359, 1982.
6. Lambert KL Vascularised patellar tendon grafts with rigid internal fixation for anterior cruciate ligament insufficiency. *Clin Orthop* 172: 85 – 89, 1983
7. Lambert KL Cunningham RR Anatomic substitution of the ruptured ACL using a vascularized patellar tendon graft with interference fit fixation. In Pesgn JA (ed). *The crucial ligaments, diagnosis and treatment of Ligamentous injuries about the Knee*, New York, Churchill, Livingstone, 1988, PP: 401-408.
8. Gial B. Liv F: Complications of intra-articular anterior cruciate reconstruction, *Clin Sports Med* 7: 835 – 848, 1988.
9. Drez D: Allograft reconstruction of ACL, *Orthop Today* 7:1-7-1987.
10. Rao P. S. Nizamuddin. S. Long term results of prosthetic reconstruction of anterior cruciate ligament. *Indian J. of orthopaedics* 28: 27-30, 1996.
11. Canale Terry S., Kay Daugherty & Linda Jones (Ed). *Campbells Operative Orthopaedics.* St.Louis: Mosby; 1998 -pg 1155.
12. Canale Terry S., Kay Daugherty & Linda Jones (Ed).*Campbells Operative Orthopaedics.* St.Louis: Mosby; 1998 -pg 1528.
13. Jackson DW, Jennings L D. Arthroscopically assisted reconstruction of the anterior cruciate ligament using a patellar tendon bone autograft. *clin sports med.*1988;7:785-800

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