

## Original Research Article

# A study on the functional outcome of arthroscopic anterior cruciate ligament reconstruction done with bone patellar tendon bone graft using the IKDC score

Vineet Thomas Abraham\*, Krishnagopal R., Vamsi Kondreddi, Swagat Mahapatra

Department of Orthopaedics, Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth University, Pondicherry, India

**Received:** 30 August 2016

**Accepted:** 03 October 2016

**\*Correspondence:**

Dr. Vineet Thomas Abraham,

E-mail: [abrahamvineet@hotmail.com](mailto:abrahamvineet@hotmail.com)

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

### ABSTRACT

**Background:** ACL injuries result in persistent recurrent instability and increased risk of meniscal tears and intra-articular damage, leading on to degenerative changes in the knee. There are many studies about ACL reconstruction using bone patellar tendon bone graft (BPTB) and its outcome, but there is not enough literature on the subjective assessment following reconstruction. We decided to do a study of the patient's subjective outcome as per the International knee documentation committee score (IKDC) and other clinical parameters following ACL reconstruction using the BPTB graft.

**Methods:** This was a prospective study consisting of 50 patients who presented with ACL injury and underwent arthroscopic ACL reconstruction using BPTB graft in our hospital in the period from May 2008 to July 2010. Patients were followed at regular intervals at 4 weeks, 8 weeks, 3 months & 6 months and 1 year. Patients were assessed at every visit with clinical tests and IKDC subjective assessment score.

**Results:** 50 patients with ACL insufficiency underwent ACL reconstruction. Postoperative knee flexion improved; the mean flexion was 131.70 with standard deviation of 6.534, which was significant. The mean preoperative IKDC was 56.97 and standard deviation of 9.188 and postoperative IKDC score was 92.33 and standard deviation 5.198 which showed a marked improvement and was statistically significant. The complications included; 8 patients with anterior knee pain, 1 case of patellar fracture while harvesting graft, which healed with wiring and 2 patients, had re-rupture of ACL due to road traffic accident.

**Conclusions:** ACL reconstruction with BPTB graft showed a significantly good subjective outcome on assessment using IKDC score. Isolated ACL reconstruction showed a better subjective outcome compared to the patients who had associated meniscal injury.

**Keywords:** Anterior cruciate ligament, BPTB graft, IKDC score

### INTRODUCTION

High speed motor vehicular trauma especially 2 wheeler accidents and sports injuries results in damage to bone and soft tissue elements especially of knee, where the ligaments and menisci constitute the modern epidemic. Estimated incidences of 0.24 to 0.34 anterior cruciate ligament (ACL) injuries per 1000 population per year

have been reported.<sup>1,2</sup> Some authors made an estimation of 250,000 anterior cruciate ligament (ACL) injuries per year worldwide.<sup>3</sup>

Sporting activities, especially those that involve deceleration, twisting, cutting and jumping e.g. in basketball, soccer etc. result in the greatest number of anterior cruciate ligament injuries. Anterior cruciate

ligament forms the pivot in the functional congruence and stability of the knee in association with the ligaments, capsule, muscles and bone.

Many authors have emphasized the importance of ACL in normal knee function. The ACL is the primary stabilizer against anterior translation of the tibia over the femur and is important in counteracting rotation and valgus stresses.<sup>4,5</sup> ACL injuries if left untreated result in recurrent instability of the knee and thus results in an increased risk of intra-articular damage, including meniscal tears and degenerative changes.<sup>4</sup> Disruption of the ACL often leads to significant disability, which can lead to changes in lifestyle.

Though there are many studies on ACL reconstruction using bone patellar tendon bone graft and its outcome, there is not enough literature on the subjective assessment following reconstruction. Hence we decided to do a study on the patient's subjective outcome as per the International knee documentation committee score (IKDC) and using other clinical parameters.

**METHODS**

This was a prospective study consisting of 50 patients who presented with ACL injury and underwent arthroscopic ACL reconstruction using BPTB graft in our hospital in the period from May 2008 to July 2010. Patients of both genders between the age group of 18 to 45 years with isolated ACL tear, or with meniscal and chondral lesions (grade I and II) were included in the study. The exclusion criteria were patients with multiligamentous injuries, patients with pre-existing osteoarthritis, patients with high-grade chondral injuries, patients with ipsilateral limb fractures, patients undergoing revision ACL surgery, and patients with nerve or vascular injury.

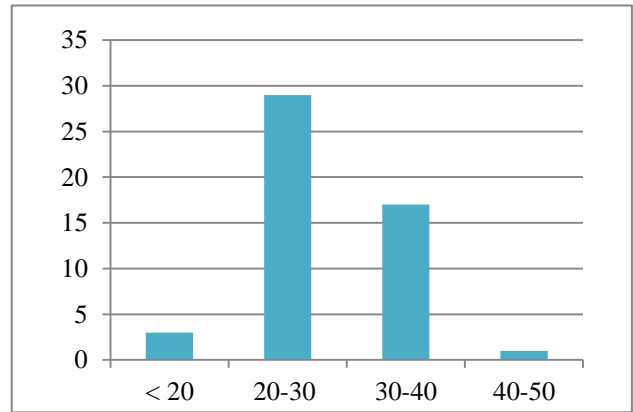
The patients with knee injury were asked for history of instability and were evaluated thoroughly using the clinical tests; Lachman test, anterior drawer test and the Pivot shift test. The diagnosis was confirmed by doing an MRI. All patients with ACL tear meeting out inclusion and exclusion criteria underwent the required preoperative blood investigation and underwent arthroscopic ACL reconstruction using the BPTB graft, meniscal tear or chondral lesions if any were recorded. Post reconstruction the patients underwent rehabilitation according to the rehabilitation protocol. Patients were followed at regular intervals 4 weeks, 8 weeks, 3 months & 6 months and 1 year. Patients were assessed at every visit with clinical tests, muscle wasting if any was recorded, presence of anterior knee pain was recorded and IKDC subjective assessment score was recorded.

**Statistical analysis**

The statistical analysis was done using the Chi square test.

**RESULTS**

A total of 50 patients with ACL insufficiency undergoing ACL reconstruction from May 2008 to July 2010 were included in the study. The age of the patients was between 18 to 45 years with the mean age being 28.06 years as shown in Figure 1. There was a male predominance with 49 males and 1 female.



**Figure 1: Age distribution in years.**

In 31 patients the right knee was involved whereas in 19 the left knee was involved. Of the 50 cases, 19 were due to sports injuries, 19 due to road traffic injuries and 12 injuries were following a slip and fall.

The preoperative knee flexion ranged from 50° to 140° the mean being 124.40 and postoperative knee flexion ranged from 120 to 140 the mean 131.7 and extensor lag of 5° was seen in 5 patients post operatively. The diagnostic arthroscopy findings were out of the 50 cases, 45 cases had complete tear of ACL and other 5 had partial tear. 10 out of 15 meniscal injuries involved medial meniscus and other 5 lateral meniscus and 10 patients had chondral defects.

Postoperative knee flexion improved; the mean flexion was 131.70 with standard deviation of 6.534 which was significant as shown in Table 1.

**Table 1: Range of motion.**

	Mean	SD	SEM
<b>Flexion-pre op</b>	124.40	13.296	1.939
<b>Flexion-post op</b>	131.70	6.534	0.953

Instability was assessed at the final follow-up using the anterior drawer, Lachman test and pivot shift test. Anterior drawer, Lachman and pivot shift were positive in 2 patients at 6 months follow up out due to re rupture of ACL following RTA. Anterior drawer and Lachman were grade 1 positive in 5 patients and pivot shift positive in 1 patient though patients did not have significant subjective and clinical instability at the final follow up as in Figure 2.

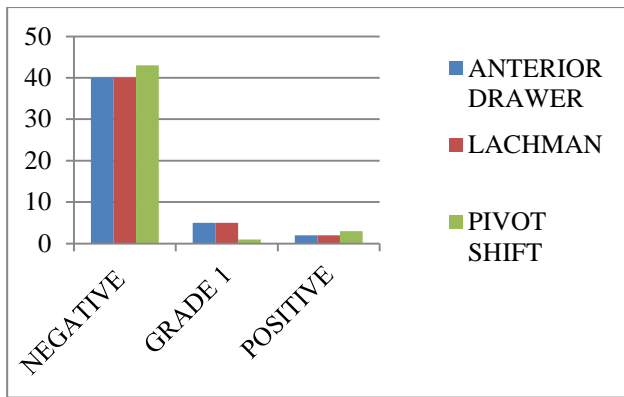


Figure 2: Tests for instability at final follow up.

Patients were assessed for thigh muscle wasting postoperatively. No wasting of thigh muscles was noted in 10 patients (21.2%), 1 cm wasting was seen in 18 patients (39.1%), 2 cm wasting was seen in 16 patients (33.2%) and 3 patients had wasting of 3 cm (6.5%) as shown in Figure 3.

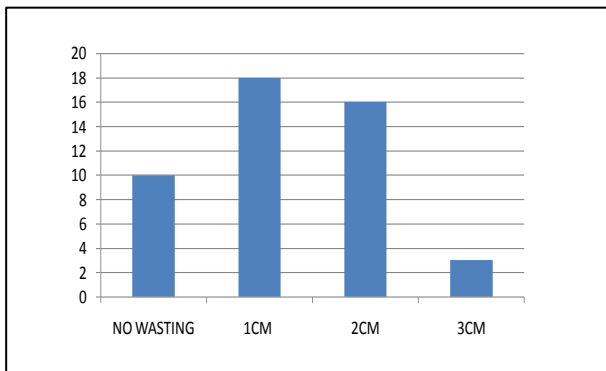


Figure 3: Postoperative thigh wasting.

We had no postoperative infection in our group of patients. All the patients were assessed with IKDC subjective assessment score preoperatively and postoperatively; there was significant increase in IKDC scores. The mean preoperative IKDC was 56.97 and standard deviation of 9.188 and postoperative IKDC score was 92.33 and standard deviation 5.198 which was statistically significant with P value <0.05 (df =45) as given in Table 2.

Table 2: IKDC scores.

	Minimum	Maximum	Mean	SD
IKDC score preoperative	38	71	56.97	9.188
IKDC score postoperative	79	98	92.33	5.198

**Complications**

Anterior knee pain was assessed at the end of 1-year post operatively, 31 patients had no anterior knee pain, 8 patients had occasional knee pain and other 8 had continuous knee pain.

Other complications at the end of 6 months follow-up were as follows, decreased sensation in anterolateral aspect of the knee in three patients which was managed conservatively, one patient had intra operative patella fracture which was managed by k-wire fixation and prolonged immobilization and the fracture healed, 2 patients had re-rupture of ACL following RTA and one patient had decreased knee ROM of 10-120.

**DISCUSSION**

Rupture of the ACL compromises the stability of the knee and leads to episodes of giving way, recurrent injury to the menisci, and premature degenerative changes.<sup>4,5</sup>

The middle third of the patellar tendon autograft for ACL reconstruction can be readily procured and firmly fixed. It can tolerate the loads produced by an intensive rehabilitation programme.<sup>6</sup> It remains the gold standard for ACL reconstruction.<sup>7</sup> In this trial there was significant improvement in subjective assessment scores of patients who underwent ACL reconstruction. ACL reconstruction with BPTB graft allows early rehabilitation and has a good clinical outcome as per our outcome analysis using the IKDC score.

Tow et al in their comparative study treated 34 patients with BPTB graft.<sup>8</sup> They had good to excellent IKDC scores in an average of 61% of patients treated with BPTB graft. They had anterior knee pain in 8 (32%) of patients treated with BPTB graft whereas in our study we had good to excellent IKDC scores in 76% of our patients which is more as compared to their study and the incidence of anterior knee pain was similar which was 16(32%) of 50 patients in our series.

In 1999, Jomha et al conducted a retrospective study in patients treated with ACL reconstruction using BPTB and assessed the knee function using the IKDC score, they found that they had good to excellent IKDC scores in 76.3% patients who had undergone ACL reconstruction at a follow up of 7 years.<sup>9</sup> In our study we had similar results with the scores varying from 79 to 98 postoperatively with good to excellent outcome in 76% of our cases.

Struwer et al in their study of 73 patients who underwent arthroscopic ACL reconstruction with BTB graft found that 75% patients had good to excellent results according to the IKDC score, but 54.2% of patients had Grade II OA changes at a mean follow up of 13.5 years.<sup>10</sup> Our patients had similar results, but we need a longer follow up to assess OA changes.

The effect of partial meniscectomy also appear to have a negative impact on the outcome of reconstruction, 15 patients (32%) who underwent meniscectomy in our study scored poorer average IKDC scores compared to 32 patients (68%) who did not undergo meniscectomy. Wu et al in their study reported on a strong correlation between the magnitude of the meniscectomy and the incidence of Osteoarthritis.<sup>11</sup>

It has been established that in spite of successful ACL reconstruction, patients may have persistent laxity and diminished motor skills for two reasons, impaired proprioception and muscle wasting.<sup>12-15</sup> Absence of proprioceptors, which are normally located in the ACL, have been reported in the ACL deficient knee.<sup>13,14</sup> Success after ligament reconstruction doesn't depend directly on the tightness or strength of the reconstruction, but rather on the quality of recovery of proprioception.<sup>13</sup> This further stresses the importance of rehabilitation after ACL reconstruction.

The primary goal of ACL reconstruction is to restore the stability of the knee joint. In our study reconstruction with the BPTB graft resulted in good subjective clinical scores. However a long-term follow up is needed to assess features like donor site morbidity and development of osteoarthritis.

## CONCLUSION

Our patients who underwent arthroscopic ACL reconstruction with BPTB graft showed a significantly good subjective outcome on assessment using IKDC score. Isolated ACL reconstruction showed a better subjective outcome compared to the patients who had associated meniscal injury.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the institutional ethics committee*

## REFERENCES

1. Daniel DM, Stone ML, Dobson BE. Fate of the ACL-injured patient. A prospective outcome study. *Am J Sports Med.* 1994;22:632-44.
2. Miyasaka KC, Daniel DM, Stone ML, Hirshman P. The incidence of knee ligament injuries in the general population. *Am J Knee Surg.* 1991;4:3-8.
3. Bobic V. Current concepts in anterior cruciate ligament reconstruction. *Am J Knee Surgery.* 1992;10:241-7.
4. Arnold JA, Coker TP, Heaton LM, Park JP, Harris WD. Natural history of anterior cruciate tears. *Am J Sports Med.* 1979;7:305-13.
5. Fetto JF, Marshall JL. The natural history and diagnosis of anterior cruciate ligament insufficiency. *Clin Orthop.* 1980;147:29-38.
6. Shelbourne KD, Nitz P. Accelerated rehabilitation after anterior cruciate ligament reconstruction. *Am J Sports Med.* 1990;18:292-9.
7. Johnson RJ, Beynon BD, Nichols CE, Renstrom PA. The treatment of injuries of the anterior cruciate ligament. *J Bone Joint Surg Am.* 1992;74:140-51.
8. Tow BP, Chang PC, Mitra AK, Tay BK, Wong MC. Comparing 2-year outcomes of anterior cruciate ligament reconstruction using either patellar tendon or semitendinosus-tendon autografts: A non-randomised prospective study. *J Ortho Surg.* 2005;13(2):139-46.
9. Jomha NM, Pinczewski LA, Clingeleffer A, Otto DD. Arthroscopic reconstruction of the anterior cruciate ligament with patellar-tendon autograft and interference screw fixation. The results at seven years. *J Bone Joint Surg Br.* 1999;81:775-9.
10. Struwer J, Frangen TM, Ishaque B, Bliemeel C, Efe T, Ruchholtz S, et al. Knee function and prevalence of osteoarthritis after isolated anterior cruciate ligament reconstruction using bone-patellar tendon-bone graft: long-term follow-up. *Int Orthop.* 2012;36(1):171-7.
11. Wu WH, Hackett T, Richmond JC. Effects of meniscal and articular surface status on knee stability, function, and symptoms after anterior cruciate ligament reconstruction: a long-term prospective study. *Am J Sports Med.* 2002;30:845-50.
12. Corrigan JP, Cashman WF, Brady MP. Proprioception in the cruciate deficient knee. *J Bone Joint Surg [Br].* 1992;74 :247-50.
13. Barrett DS. Proprioception and function after anterior cruciate ligament reconstruction. *J Bone Joint Surg [Br].* 1991;73(5):833-7.
14. Barrett DS, Cobb AG, Bentley G. Joint proprioception in normal, osteoarthritic and replaced knees. *J Bone Joint Surg [Br].* 1991;73 :53-6.
15. Hurley MV. The effects of joint damage on muscle function, proprioception and rehabilitation. *Manual Ther.* 1998;2:11-7.

**Cite this article as:** Abraham VT, Krishnagopal R, Kondreddi V, Mahapatra S. A study on the functional outcome of arthroscopic anterior cruciate ligament reconstruction done with bone patellar tendon bone graft using the IKDC score. *Int J Res Orthop* 2016;2:346-9.