

Functional Outcome after Reconstruction in Patients with Anterior Cruciate Ligament Injuries after Roadside Accident in Non-athlete Population

Pawan Kamal¹, Shekhar Singhal², Akshdeep Bawa³, Rajnish Garg²

Abstract

Rupture of the ACL is one of the most common sports injuries in active young people. The exact incidence of anterior cruciate ligament injuries is unknown. Other than sports injuries, road side accidents are the second most common cause of ACL injury. There are no studies where the results after ACL reconstruction done for an acutely injured knee as a result of road side accident have been documented. Our study aimed to determine if the functional outcome was satisfactory if it was done in a patient of road side accident irrespective of any associated meniscal injuries and to evaluate the complications.

Methods: This prospective study was conducted in the Department of Orthopaedics of Dayanand Medical College and Hospital, Ludhiana, Punjab. The patients presenting with knee injury at indoor/ outdoor patient Department of Orthopaedics for period starting from Jan 2007 to Dec 2011 were taken up for study. The diagnosis was confirmed clinically as well as radiographically. Patients with multiligamentous injuries were excluded from the study. Reconstruction was done arthroscopically using ipsilateral Quadrupled hamstring or patellar tendon autograft. Standard operative technique of transtibial ACL reconstruction was followed. The patients were followed at 6 months and one year postoperatively from 2007 to 2011 for assessment of functional results. A total of 107 patient met the inclusion criteria out of which 102 patient could be examined clinically while 5 patients were lost to follow up and one patient died due to some natural cause. After completion of study observations were tabulated & were analyzed qualitatively as well as quantitatively using proper statistical methods.

Results: Post operatively, instability disappeared in 100(98.04%) patients post ACL reconstruction. Only 2(1.96%) patients had occasional episode of instability the operated knee. One patient had instability due to missed postero-medial instability. The mean preoperative subjective IKDC score was 37.9513.88 and post-operative subjective IKDC score changed to 87.9010.07 after ACL reconstruction. After comparing the two scores the P value came out to be <0.001 which was highly significant.

Conclusion: Road traffic accidents and Sports injuries are the commonest cause for anterior cruciate ligament injuries in our country. Arthroscopic ACL reconstruction provides a stable knee with minimal complications. Arthroscopic anterior cruciate ligament reconstruction with BPTB and ST/G grafts is an excellent treatment option for anterior cruciate ligament deficient knees after road side accidents.

Keywords: ACL injury, road side accident, non athletes, functional outcome

Introduction

Of all the knee ligaments, the anterior cruciate is the most frequently injured [1A]. Rupture of the ACL is one of the most common sports injuries in active young people [2]. The exact incidence of anterior cruciate ligament (ACL) injuries is unknown [3]. Most surgeons perform reconstruction using autogenous graft using either patellar tendon or hamstring tendons

[4]. Therefore, the choice of surgeon made by the referring general practitioner decides the type of graft and the outcomes the patient will benefit.

Jomhaet al. [5] suggested that reconstruction of ACL should be done early, before further damage to the joint occurs. Injuries of the ACL rarely occur in isolation. Reports of meniscal injury associated with acute ACL disruption range

from 15% to 40% and become much higher with chronic ACL deficiency. Occult osteochondral lesions (bone bruises) are also commonly found in association with ACL injuries [6].

Patients who may be satisfactorily treated with non-surgical intervention, despite a totally disrupted ACL, include those who have little exposure to high-risk activities such as sports and heavy work activities,

those who are willing to avoid high-risk activities, those who are more than 40 years of age, those who are successful in prolonged coping or adapting to an ACL insufficiency,

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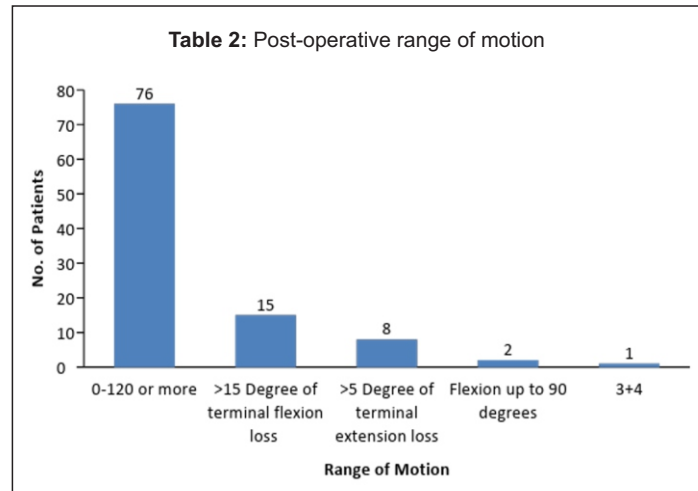
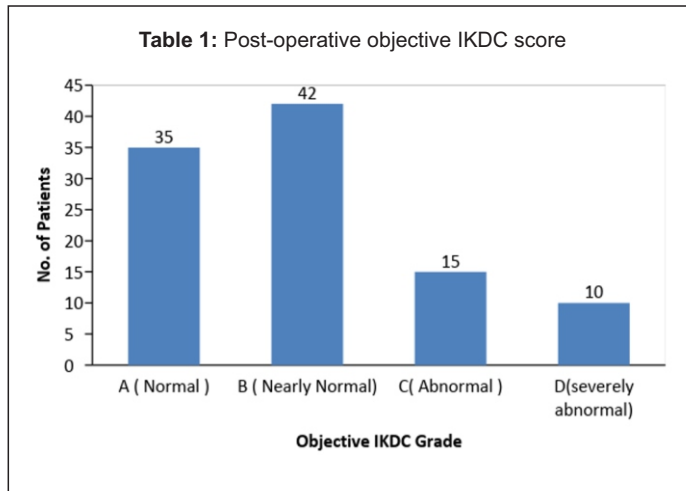
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those who have advanced arthritis of the involved joint, and those who are unable or unwilling to comply with post-reconstruction rehabilitation [7]. One of the common causes of the ACL injury in Punjab state and other parts of North India is scooter or motorcycle accidents where the rider brakes suddenly, and plants his leg to the ground to balance himself. The other mechanism is dashboard injuries in head-on collisions. Patients with such ACL injuries are prone to develop tears of menisci and this can lead to secondary osteoarthritis. Our aim in this study was to assess the results and evaluate the complications after arthroscopic ACL reconstruction (ACLR) done for patients with tears of ACL injuries after roadside accidents. We also compared the effect of associated meniscal tears on the functional outcome.

Materials and Methods

The patients presenting with knee injury at indoor/outdoor patient the department of

orthopaedics for the period starting from January 2007 to December 2011 were taken up for study.

Inclusion criteria: 1. All age groups, any gender that undergo arthroscopic ACLR. 2. Patients having acute ACL tear diagnosed clinically and on MRI after roadside accidents. 3. Patients with symptom-free contralateral knee.

Exclusion criteria: 1. Patients not willing to give informed consent. 2. Patients with Grade III or IV chondral damage or abnormal radiographs. 3. Patients having symptomatic contralateral knee. 4. Patients having injuries of multiple ligaments of the same knee.

Recording of Tegner activity scale, Lysholm scale, and IKDC scale was done [8-10].

Operative procedure Those patients with confirmed ligament tear were taken up for ligament reconstruction after initial stabilization of vitals and after preanesthetic clearance. Operative procedure was carried out under appropriate anesthesia (spinal, epidural, or GA). Two most commonly used grafts, namely, bone patellar tendon bone graft and quadruple hamstring tendon graft were used for ACLR which was dependent on the surgeon's choice.

Two standard entry points were made over the knee anterolateral and anteromedial. Anterolateral portal

was located approximately 1 cm above the lateral joint line, 1cm lateral to margin of patellar tendon, and approximately 1 cm inferior to patella. Anteromedial portal was located 1 cm above the medial joint line, 1 cm inferior to tip of patella, and 1cm medial to edge of patellar tendon. After inserting the arthroscope, through arthroscopic examination of knee joint was done and torn condition of ACL was again confirmed and other structures were also be examined such as associated tear of medial and lateral meniscus and chondral damage. Once the torn ACL was confirmed on arthroscopic examination, the ACLR will be done as per the standard protocol.

Post-operative care Patient was encouraged to lie supine with foot end elevated for 24 h, as spinal anesthesia was given during procedure. He was encouraged to use ice packs to reduce the swelling. Round the clock analgesia (initially i.v., later oral) was administered to assist in physiotherapy. Patient was given intravenous antibiotics for 3 days. The knee immobilizer was worn while sleeping for the 1st 4 weeks and at all times while walking for the 1st 6 weeks. Sutures were removed on the 12th post-operative day.

Rehabilitation Rehabilitation program was divided into four phases with following goals: 1. Immediate phase (0-2 weeks). 2. Control of pain and swelling with rest, cryotherapy, NSAIDs, and compression bandage.

Recovery of full range of motion with active flexion and passive/self-assisted extension, especially in the last 45°.

Isometric quadriceps and hamstring exercises with ankle pumps.

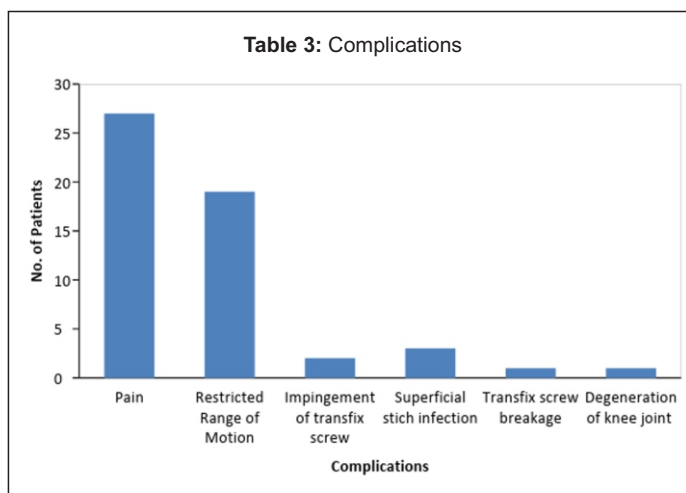




Figure 1: Harvested semitendinosus and gracilis tendon grafts.

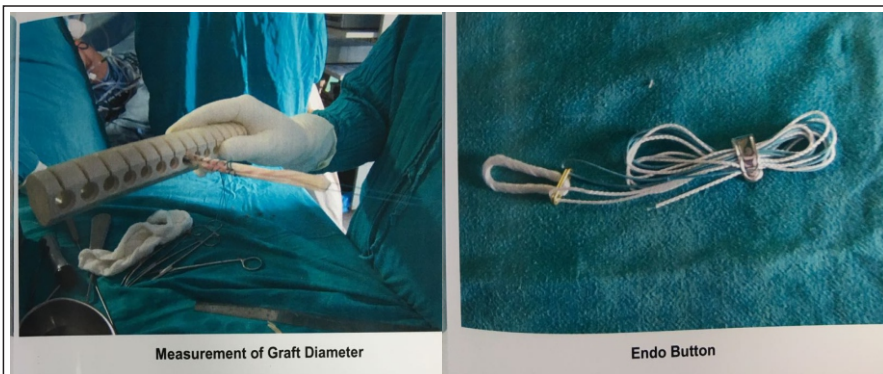


Figure 2: Graft diameter measurement to determine tunnel size.

Reestablishment of normal gait by walking with crutches and knee brace.

3. Early phase (2–5 weeks).

Full range of motion, active extension from 0 to 45, 60 to 65% quadriceps strength.

Begin agility drills and proprioception activities by 5th week.

Brace-free, normal gait pattern without crutches.

4. Middle phase (5–12 weeks).

Full active range of motion, athletic activity (swimming, bike).

5. Late phase (3–6 months).

90% isokinetic quadriceps activity by 6 months.

Observations and Results

All patients with torn ACL were operated with arthroscopic ACLR and were followed at 6 months and 1 year postoperatively from 2007 to 2011 for the assessment of functional results. A total of 107 patients met the inclusion criteria, out of which 102 patients could be examined clinically while five patients were lost to follow-up and one patient died due to some natural cause. The follow-up period ranged from 12 months to

48 months. After completion of study, observations were tabulated and were analyzed qualitatively as well as quantitatively. In this study, a total of 102 patients were included in the study, out of which bone-patellar tendon-bone (BPTB) was done only in 19 patients and hamstring tendon graft was used in 83 patients for ACLR. The maximum age was 57 years and minimum age was 14 years with a mean age of 27.47 ± 8.99 years. Male predominance was noted in this study with 82 (80.39%) patients sustaining injury to the knee joint with complete or partial tear of ACL as compared to only 20 (19.61 %) females. A total of 26 patients (25.49%) had medial meniscal injury associated with the ACL injury. Lateral meniscus was injured in three patients (2.94%) and one had both the menisci injured. All meniscal injuries were managed at the time of ACLR. Two patients had meniscal tears on the operated limb 1 year after ACLR for which partial meniscectomy was done. All patients included in this study had their ACL reconstructed within 6 months of the diagnosis. Among the parameters of

Lysholm score, every patient had a history of knee instability after varying types of efforts. Some were those who experienced instability only after severe exertion or athletic activity others were those who noticed it often while doing daily routine activity very less were those who frequently noted instability during routine activities. One patient with associated medial collateral ligament injury had instability on taking every step. Atrophy of the thigh was noted in only 7(6.86%) patients. Atrophy was measure as a mid thigh circumference with a measuring tape. 95(93.13%) patients had comparable mid thigh circumferences on both the sides. Postoperatively, instability disappeared in 100(98.04%) patients post-ACLR. Only 2(1.96%) patients had occasional episode of instability the operated knee. One patient had instability due to missed posteromedial instability. On observing the parameters of IKDC score, 26(25.49%) patients had loss of flexion with varying degrees of flexion loss preoperatively and 87(85.29%) had 3+ Lachman’s grade, i.e., 10 mm anterior tibial translation without an endpoint.

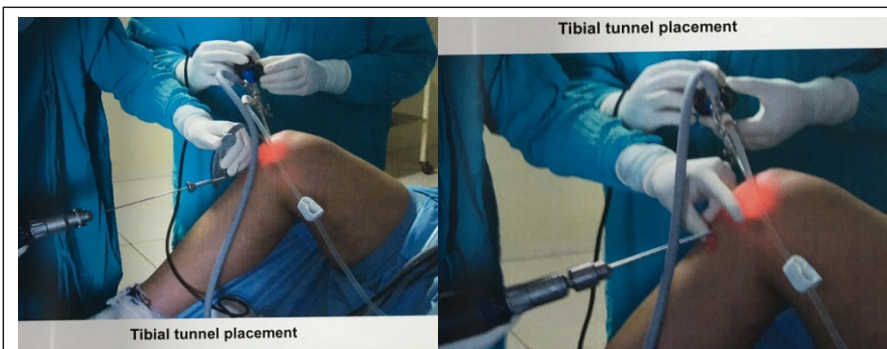


Figure 3: Placement of the tibial tunnel using guide.



Figure 4: Marking the graft.

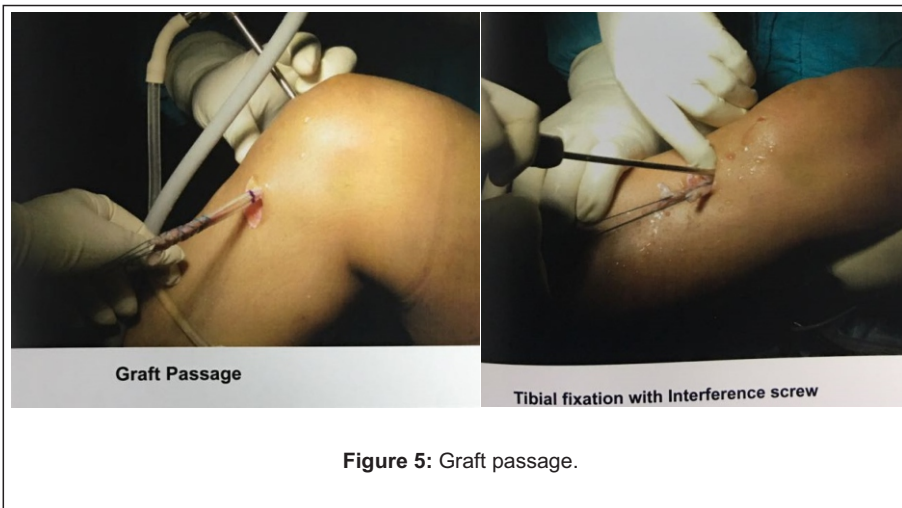


Figure 5: Graft passage.

After reconstruction, 18 (17.65%) had limitation of terminal flexion and out of these 3 (2.94%) patients were not able flex their knees beyond 90° while 8 (7.84%) were those with more than 15° of terminal flexion loss. One patient had <60° of flexion and 10° of terminal extension loss. Only 2 (1.96%) patients had persistent positive Lachman's test with <5mm of anterior translation.

Excellent to good results were noted in 87 (85.29%) patients. The mean post-operative Lysholm score was 89.77 ± 7.28 . The mean pre-operative subjective IKDC score was 37.95 ± 13.88 and post-operative subjective IKDC score changed to 87.90 ± 10.07 after ACLR. After comparing the two scores, P value came out to be <0.001 which was highly significant.

Effect of meniscal injury on final functional scores: The effect of meniscal injury and delay of surgery after ACL injury on the post-operative functional outcome was studied. Group A included those with meniscal injury and Group B with no meniscal injury. In this study, 64 patients (62.74%) in Group B had no meniscal injury associated with ACL tear while 38 (37.25%) in Group B had either medial, lateral, or both meniscal injuries. The mean functional outcome according to Lysholm scale was 89.64 ± 7.505 patients in Group B and 90.00 ± 6.983 (P=0.81) in Group A. Mean subjective IKDC score was 87.87 ± 9.37 and 87.95 ± 11.30 (P=0.968) in both the groups, respectively. These findings were not statistically significant and indicated that there was no effect of meniscal injury on the post-operative functional outcome.

Discussion

In this study, a total of 102 patients were included in the study, out of which BPTB was used as graft in only 19 patients, and hamstring tendon graft was used in 83 patients for ACLR. The mean Lysholm score in hamstring tendon group was 87.069 ± 10.80 and it was 88.437 ± 6.343 in the BPTB group with P= 0.75, and mean post-operative subjective IKDC score was 89.45 ± 7.67 and $89.11 \pm$ in HT and BPTB groups, respectively, with P= 0.36 which shows that there was no significant difference between both the groups. Similar outcomes have been reported in the studies of Keays et al., in 2007, and Barenius et al., in 2011 [11,12]. Ours were the only study comparing the outcome of the two types of grafts exclusively in patients with roadside accident.

In this study, all patients who were operated for torn ACL had a history of road traffic accident. Svensson et al., [13] in 2006, in his study, noted 53 patients with athletic injury and only six patients were with non-athletic cause of ACL injury. Whereas, Lee et al. [14] also found athletic injuries the major cause of ACL injury in 204 patients and non-athletic injuries were the cause in only 38 patients. In the present study, the age ranged from 14 to 57 years with mean age of 27.47 years with standard deviation of 8.23 which is quite similar to the Webb et al. [15] 13–42 (25), Drogset et al. [16] 18–45 (27), Sadoghi et al. [17] 16–46 (30), Gifstad et al. [18] 18–49 (27), and Bourke et al. [19] 14–62 (25.8). There was no influence of age in relational to post-operative objective or subjective functional outcome scores.

In our study, more than five of extension deficit was present in 8 (7.84%) patients and flexion loss of >15 was present in 15 (14.71%) patients. The reason behind the restriction of range of motion may be the poor compliance with the post-operative rehabilitation protocol since most of the patients were non-athletes and were not motivated enough. Svensson et al., [13] in 2006, in his study, noted the flexion deficit in BPTB group to be present in 46% patients and in ST/G group it was 65% at 2 years of follow-up. Extension deficit was 39% and 23%, respectively. In our study, 15 (14.70%) were scored Grade 2 and 87 (85.29%) as Grade 3 on Lachman test in the pre-operative evaluation. No patient was given score of 1 or zero. Postoperatively, the grade was 0 in 100 (98.03%) patients suggesting a very highly significant change. Though two patients had positive Lachman's test of Grade 1 postoperatively, at 1 year follow up there was no functional impairment. In a study by Corry et al. [20], Lachman testing demonstrated 81% (62) of the patellar tendon group and 75% (58) of the hamstring tendon group had Grade 0 laxity. 20% (15) of the patients in the patellar tendon group and 22% (17) in the hamstring tendon group had Grade 1 laxity. Two patients with hamstring tendon grafts had Grade 2 laxity.

Complications

The most common complication in this study was anterior knee pain, particularly kneeling pain. Kneeling, the commonly acquired posture in many daily activities of Punjabi people, was particularly mentioned mainly by the BPTB group. Knee pain was present in 27 (26.47%) patients. The second common complication was failure to regain full range of motion at knee. The most common reason found in this group of patients was the inability to follow the post-operative rehabilitation protocol. Other complications noted were the superficial stitch infection in three patients. In one patient infection settled with extended use of oral antibiotics and regular ASDs after 1 month, whereas other two patients developed superficial stitch infection within the 1st 10-day post-ACLR and were treated with debridement and secondary suturing in the operation theater. Two patients had

impingement of transfix screw from the tibial side. In one of which screw was withdrawn to relieve the symptoms while other patient refused for any kind of treatment after dissatisfying with the treatment though he had a good functional score post-ACLR. One patient gave a history of breakage of the transfix screw from the tibial end 1 year after ACLR while playing for which revision ACLR was done outside Dayanand Medical College & Hospital. Two patients noted altered sensations over the anterior aspect of proximal leg without any functional impairment.

One patient was diagnosed with degeneration of the articular cartilage 24 months after ACLR when he presented with knee pain and severe restriction of range of motion at knee. Arthroscopic debridement and arthrolysis was done. The articular cartilage and both the menisci were grossly degenerated but the reconstructed ACL was

intact arthroscopically.

O'Brien et al.,[21] in 1991, reported patellar pain in 37% (30 of 80) of knees after ACLR with patellar tendon graft. They stated that this remained an unsolved problem.

Aune et al.,[22] in 2001, conducted a randomized study with 2-year follow-up of 72 patient comparing BPTB and hamstring tendon autograft. They reported that 16.1% and 12.5% of the patients experienced anterior knee pain in both the groups, respectively.

Drawbacks of the present study
The drawback of this study was that the study was conducted on the patients from the general population. None of the patients were elite athletes so the return to sports activity could not be compared with the studies mentioned above.

No set physiotherapy rehabilitation protocol was followed during the period between ACL injury and ACLR. As this study presents a midterm minimum follow-up of

upto 36 months, we cannot give precise information about long-term outcome and associated developments.

Summary and conclusions

Road traffic accidents and sports injuries are the most common cause for ACL injuries in our country. Arthroscopic ACLR provides a stable knee with minimal complications. Arthroscopic ACLR with BPTB and ST/G grafts is an excellent treatment option for ACL deficient knees after roadside accident. Meniscal injuries do not affect the final outcome in ACL reconstructed patients in short-term follow-up. The most common complication with ACLR is the anterior knee pain which is more so common in BPTB group as compared to ST/G graft. The pain is more common while kneeling in BPTB group. It was observed that the satisfaction level of patient was same irrespective of the type of graft used for ACLR.

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