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Functional assessment of patients with anterior cruciate ligament reconstruction (ACR) – A midterm term follow up study in the Indian scenario

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Abstract

Introduction: Anterior cruciate Ligament (ACL) injury is a commonly encountered clinical entity in orthopaedic 1, 2.

Arthroscopic assisted ACL reconstruction is either carried out using bone patellar tendon – bone composite graft (BPTB composite graft) or a soft tissue auto graft such as quadrupled hamstring tendon graft.1, 2

The functional demand of our patients following reconstruction surgery differs from that of high demanding western population 3. Functional activity and demands of Indian patients is influenced not only by post-operative rehabilitation but also by financial implications, social and psychological factors. Although ACL injury can be managed conservatively, the results are not encouraging because of accelerated degenerative changes that happen due to repetitive damage to the knee as a result of continued instability 1, 2. The impact of psychological factors (especially fear of re injury, re surgery, and hospitalization), nature of professional activities and social factors on functional recovery from ACL reconstructive surgery have not been well studied in our patients

Aim: The aim of the study is to determine the functional status and activity level in ACL reconstructed patients and identify and evaluate the factors that plays a role in the recovery after ACL reconstruction surgery.

Methodology: 30 adult patients who had undergone Arthroscopic assisted Anterior Cruciate Ligament Reconstruction surgery with an average follow up period of 3.5 years and fulfilling inclusion and exclusion criteria were selected.

Subjective and Objective assessment of these patients were done clinically and by subjective IKDC form, Tegner activity level, Lysholm scoring and Psycho-social questionnaire and data analysed. Data was analyzed using student t test and chi-square test.

Results: The mean age the patients in study was 31.4 years. 87 % were male and 13 % were females. 17 (56.66%) patients returned to their pre-injury activity level whereas 13 patient did not returned. Most common mode of injury in our patients were road traffic accident followed by Recreational and leisure sports related injury. Majority of the patient (60%) underwent ACL reconstruction by hamstring graft by anatomical reconstruction followed by Bone patellar tendon bone (BPTB) graft by trans-tibial technique (26.66%). The mean subjective IKDC score was 68.50% and patient who returned it was 70.85% and patient who did not returned was 65.42%. The mean Tegner activity level preinjury was 6.53 and post-surgery was 4.87. The mean Lysholm score in patient who returned was 94.71 and who did not returned was 87.08. The IKDC grade (A & B) in patient returned was 94.11% and patient who did not returned was 46.15%. 71.42% of patients who did not returned to pre-injury level was due to fear of re-injury.

Conclusion: Significant number of patients did not return to their pre-injury activity (43% patients) level due to psycho-social factors like morbid fear, social reasons like change of priorities and family and other commitments.

Keywords: ACL, IKDC subjective, IKDC grade, Tegner, Lyshom, psycho-social

Introduction and Background

Anterior cruciate Ligament (ACL) injury is a commonly encountered clinical entity in orthopaedic 1, 2. Arthro scopic assisted ACL reconstruction is either carried out using bone patellar tendon – bone composite graft (BPTB composite graft) or a soft tissue auto graft such as quadrupled hamstring tendon graft.1, 2. The majority of our patients injure ACL following a freak accident while ACL injury has been described as a classical high grade sporting injury in western populations 3.

The functional demand of our patients following reconstruction surgery differs from that of high demanding western population 3. Functional activity and demands of Indian patients is influenced not only by post-operative rehabilitation but also by financial implications, social and psychological (fear of re-injury, fear of re-surgery) factors 3.

Although ACL injury can be managed conservatively the results are not encouraging because of accelerated degenerative changes that happen due to repetitive damage to the knee as a result of continued instability 1, 2. The technical issues that influence the recovery from ACL reconstruction surgery have been studied extensi vely 4. The impact of psychological factors (especially fear of re injury, re surgery, and hospitalization), nature of professional activities and social factors on functional recovery from ACL reconstructive surgery have not been well studied in our patients. Our study aims at evaluating these factors in the functional recovery of ACL injury in Indian patients.

Aims and Objectives

1. To determine the functional status and activity level in ACL reconstructed patients.

2. To identify and evaluate the factors that plays a role in the recovery after ACL reconstruction surgery.

Materials

30 patients registered in Orthopaedics Department in Bangalore Baptist hospital who had undergone Arthro scopic ACL reconstruction surgery. Patients who had undergone arthroscopic assisted ACL reconstruction with a minimum follow up of 2 years between age group 18 to 40 years were included while patients with bilateral ACL injury, multi ligament knee injury, repeat injury to the same knee or contra lateral knee and associated lower limb fractures were excluded from the study. The study population included patients from general population and patients who participates in leisure and recreational activities.

Patient's activity level was asked preinjury and post-surgery and graded according to the charts and proforma. The study was explained to the selected patients and those who consented were recruited in the study. Detailed history was taken from patient and IKDC subjective assessment form were filled after interviewing selected patients and each patient was given a score and depending upon that it given a percentage. The Tegner activity level was asked from patient pre-injury level and current level and both were compared for any significance. Lysholm scoring were done and all the selected patient were interviewed and each patient were given a score and compared between patients who returned and from patients who did not return. Clinical evaluations were done using IKDC objective assessment form (modified) by orthopaedic surgeon who had experience of managing ACL injury and post-operative functional assessment. Patients were grouped into 4 groups depending on the clinical finding i.e., Normal, near normal, Abnormal and severely abnormal. Patients in returned and not returned groups were analysed and its significance were noted. Clinical examination were done in standard manner as per guidelines given IKDC objective assessment form.

Evidence of laxity by Lachman and anterior drawer test done and graded. One leg hop test was noted and compared to the contralateral normal knee and graded into normal, near normal, abnormal, and severely abnormal.

Figure 1: Single leg hop test done on patient who had undergone ACL reconstruction with follow up of 2 years.

In patients who did not return to their original activity, reasons for not returning to their original activity level were asked. Those patients who did not return due to fear, their level of fear was graded and analysed. The psychosocial, and economic background of each patient were taken through use of the data collection forms. Each patient were given score for psychosocial and

economic status and functional state of the knee and the data analysed.

Statistical Analysis

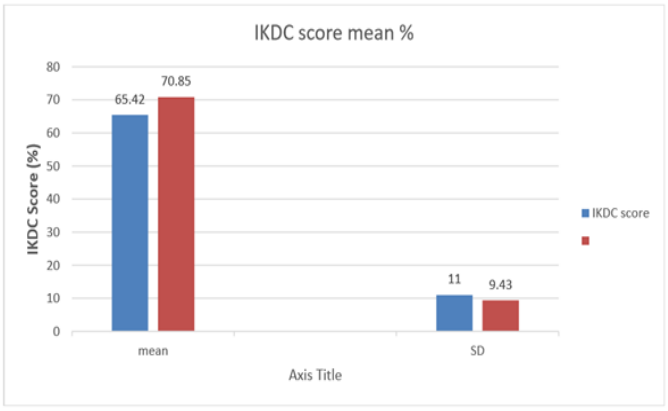
Descriptive and inferential statistical analyses were carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. Student t test (two tailed, independent) has been used to find the significance of study parameters on the continuous scale between two groups (Inter group analysis) on metric parameters. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on the categorical scale between two or more groups.

Results

Thirty patients who had undergone ACL reconstruction surgery with a mean follow up of 3.5 years and mean age was 31.4 years. 87 % were male and 13 % were females. 17 (56.66%) patients returned to their pre-injury activity level whereas 13 patient did not returned. Most common mode of injury in our patients were road traffic accident followed by Recreational and leisure sports related injury. Majority of the patient (60%) underwent ACL reconstruction by hamstring graft by anatomical reconstruction followed by Bone patellar tendon bone (BPTB) graft by trans-tibial technique (26.66%).

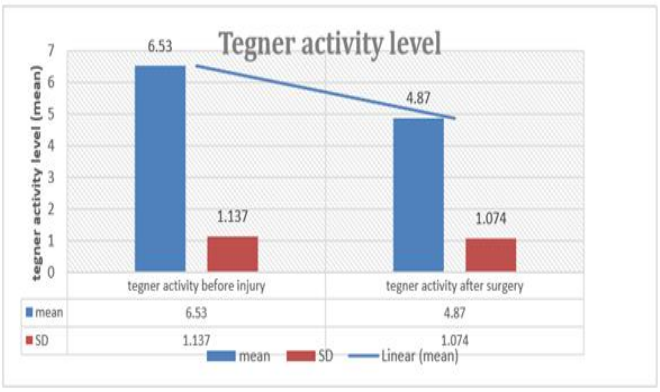
The mean IKDC subjective score of patient who returned to preinjury level was 70.85% and patient who did not was 65.42%. So patients in group who did not returned to their original activity level IKDC mean score was less than patient who returned. However this value was statistically not significant. (0.157). However, the mean IKDC score is 68.50 which is less the score in group which returned to preinjury activity level, but more than those who did not return to preinjury activity level.

Graph 1:



The mean Tegner activity score of patient before injury was 6.53 and mean score after surgery is 4.87 and there is significant reduction in Tegner activity level between two groups which is statistically significant.

Graph 2:

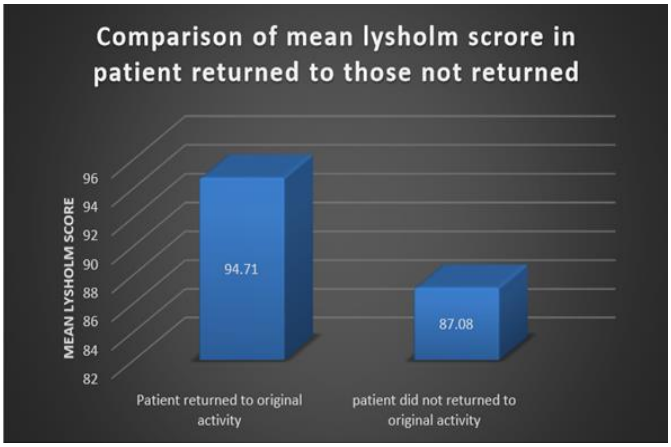


The mean Lysholm score of patients who returned is 94.71 to those who did not returned 87.08.

The difference was found to be statistically significant (p value = 0.022). It indicates that patient with high mean Lysholm score have a high possibility of returning to their original activity level and compared to those who have less mean score.

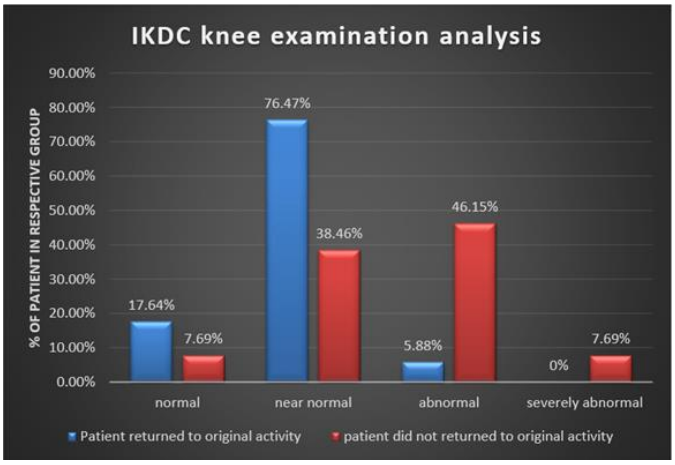
In our study patient who returned have high mean Lysholm score (94.71) which falls in excellent group.

Graph 3:



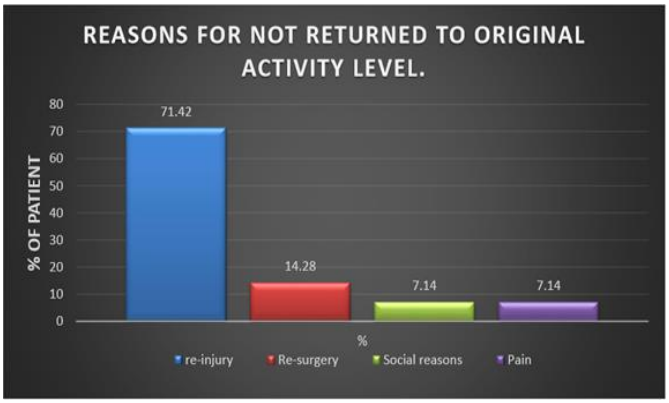
Patient returned to their original activity level almost 94.11% of the patient comes into normal or near normal knee function whereas patient who did not returned to their original activity level only 46.15% of patient had normal or near normal knee function. This difference was statistically significant (p value 0.033). So patient with normal and near normal knee function according to the IKDC knee evaluation form, high possibility of them returning to their original pre surgery activity level.

Graph 4:



Total 13 patient did not returned to their original activity level, out of those the most common cause were fear of re-injury which account for 71.42 % (10 patients) and second most common was fear of re-surgery which was 14.28% (2 patients) and rest 1 patient was social reasons and 1 patient was due to pain (one patient common in re-injury and re-surgery group)

Graph 5:



Discussion

Anterior cruciate ligament is the most important anterior restrain of the knee. The injury to this ligament is often accompanied by other intra-articular structures**.**1, 2**.** Most common mode of injury is sporting activities especially young patients who are high demanding in their activities 1, 2. Arthroscopic assisted ACL reconstruction with autograft (soft tissue graft, bone and soft tissue composite graft) 1, 2. The important outcome measure of ACL reconstruction surgery is patients returning to their pre-injury level after reconstruction surgery irrespective of surgical strategies and rehab protocol 25. Several studies have highlighted this fact of reduction of sports persons returning to their pre-injury activity over a period of years 28. Very high level of motivation may be necessary to keep them at peak performance level 28. This also reported in various studies that higher the age of surgery lesser are the chances of returning to their pre-injury level for the fact that change in social responsibilities, family life, and other preference in their life activities accordingly 36. In our study we have analysed factors responsible for patients to change their activity level and subjective

patients' factors that may be responsible for their reduced motivation to return to pre-injury level.

According to study by Devgan et al 25 the mean age of patients in their study was 23.6 years and 91.66% comprises of male patient. In the study done by Lee et al 23 the mean age of patients was 24.8 years and 95.3% were male and 4.7 % were females. The mean age in our study was 31.47 years and 87% comprised of male and 13% were females. The mean age of the patients in our study is high and it could be the fact that the cohort is from general population and majority are not involved in regular sporting activities. Also noted that percentage of female is high for the same reason.

Table 1:

Different study groups	Means age (years)
Devgan [25]et al	23.6
Lee [23]et al	24.8
Ours	31.4

The studies in literature were done on sporting group of patient who are involved in competitive sports as compared to our study which is done on patient who are from general population and majority were only involved in recreational and leisure sporting activities. The most common mode of injury in our study was Road traffic accident (RTA) 36.66% and Recreational and Leisure sports related injury 36.66%. Our patients were low demanding patients and consulted only when they faced difficulty in doing activity of daily livings (ADL).

In a study by Devgan et al 25 mean IKDC subjective was 87.6% and study by Lee et al 23 it was found to be 84.6 in patients who returned to pre-injury level. In our study the mean IKDC score was 70.6 which is lower the value given in the literature. The subjective IKDC values were significant in above mentioned studies between pre injury and post-surgery level as compared to our study. The possible explanation could be that population cohort is from general population and low demanding individuals. The baseline IKDC value of these population was lower. There was no significant difference noted in our study between patients who returned as compared to patient who did not. Similar results found by Gobbi et al 31 in his study.

Table 2:

Different study	Mean Subjective IKDC score (%)
Devgan[25] et al	82.8
Lee[23] et al	79.5
Ours	68.5

Patients who returned to their pre injury level, IKDC grade i.e. objective clinical assessment was found to be higher as compared to those who did not returned. In a study by Devgan et al 25, normal and near normal grade was 95.4% and by lee et al 23 it was 89.3%. In our study the IKDC grade A & B was 94.11%. In all the study and in ours as well patient who did not returned to their preinjury activity level the IKDC grade was lower than patient who returned. The patient with normal or near normal IKDC grade have high possibility of returning to their pre injury level. In other way, patient to return to their pre injury activity level, the IKDC grade should be high which can be seen in several other studies in literature.

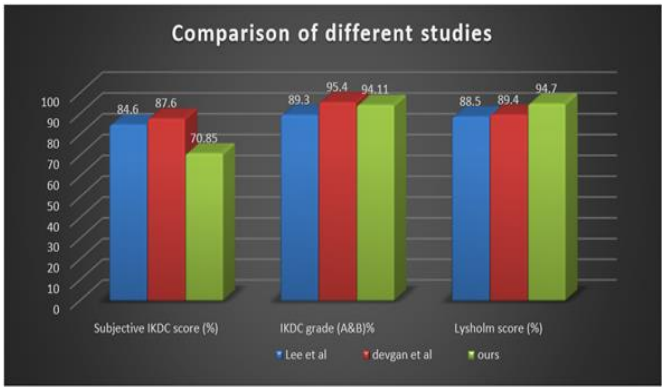
The Lysholm score is a measure of knee function, symptoms and disability. It consist of 8 components which is measured on scale of 100. The mean Lysholm score in patient who returned to their preinjury level was 94.71% which is higher and statistically significant than patient who did not returned. In study by Devgan et al 25 and Lee et al 23 the Lysholm score in patients who returned to their preinjury level were 89.4% and 88.5% respectively which were statistically significant.

The Tegner activity level is a score devised to grade the patients' activity level and allows to grade the patients' activity level preinjury and post-surgery. In our study it was found to be statistically significant between preinjury level and post-surgery level. The mean Tegner activity level was 6.53 which reduced to 4.87 whereas study by Devgan et al 25 the mean was 7.72 preinjury and reduced to 6.92.

Table 3: Comparison between different studies of variable in patients who returned to their preinjury activity level

Study	Subjective IKDC score (%)	IKDC grade (A & B) (%)	Lysholm score (%)
Lee et al [23]	84.6	89.3	88.5
Devgan et al [25]	87.6	95.4	89.4
Our	70.85	94.11	94.7

Graph 7:

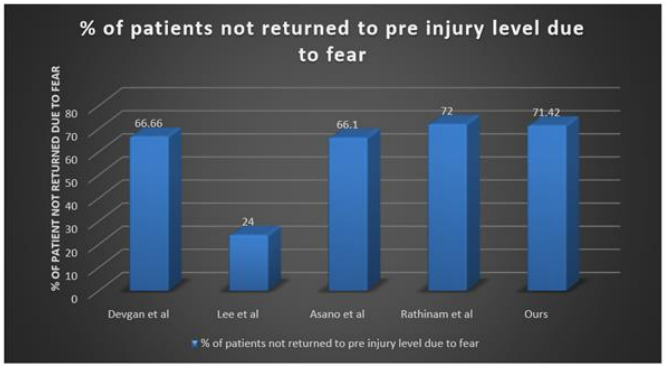


Comparison between different studies

In all above studies, the Subjective IKDC score, IKDC grade (A & B) and Lysholm score are comparable with other studies. Patient who returned to their original activity level had high values as compared to patient who did not returned.

Out of 30 patients, 17 returned to their original activity level (56.66) which is comparable to the literature. According to study by Devgan et al 25 only 45.8% returned to their original activity level whereas in study by lee et al 23 62.2% returned to original activity level after surgery. Study by Gobbi et al 31 and Smith et al 28 65% and 71.4% returned to their preinjury level respectively.

Graph 8:



Patients not returned to pre injury level due to fear in different studies.

Study by Kvist et al 30 used Tampa scale of Kinesiophobia (TSK) to quantify the fear of injury due to physical activity. In his study 53 % return to preinjury level and patient who did not returned had high fear for re-injury. Asano et al showed 66.1% fear in patient who did not returned to their pre injury level.

Smith et al 28 found that 81% of their cohort of competitive athletes returned to sports within 12 months after surgery which dropped to 71.4% at the end of 43 months. About 21.8% were playing sports despite functional impairment in the operated knee. In his study he observed that the motivation to return to sports in competitive athletes may be the factor that see a higher percentage of them returning to competitive sports. Significant number of athlete not able to return to competitive sports post-ACL reconstruction. They also found that number of patients who returned to competitive sports dropped at end of 3 years as compared to 1 year. Thus, it is important to look and assess the patients for the return to competitive sports beyond 1 to 2 years after ACL reconstruction surgery.

In our study, no significant difference noted in IKDC subjective scoring in patient who returned to pre injury status as compared to those who did not returned. Similar finding reported by study Gobbi et al 31 which showed no significant difference in patient returned and in patient who did not returned. The instrument used were not able to estimated patient returning to preinjury level. They proposed psycho-social issue as factors with those patients not returning to their preinjury level in spite their score in IKDC, Lysholm other parameters remain comparable.

There is significant number of patients who did not returned to their preinjury level as evident from number of studies in literature and similar finding noted in our study as well. One of the reason for not returning to their preinjury status was fear which is very high in patients who undergo ACL reconstruction surgery. Psycho-social factors were studied and found that patient with good knee function which is evident by high IKDC grade, Subjective IKDC score and good Lysholm score were not able to return to preinjury level even in spite of having good knee. The technical aspect remain constant and all the patient underwent the same ACL rehabilitation protocol post operatively.

Our study highlight the fact that the pycho-social issue and social and economic factors does play a significant role in patient from developing country like India. The social and economic pressure had a bearing on our Indian patient to return to preinjury status. There is significant number of patient who had not returned to their preinjury level due to fear that their knee is still weak or fear of reinjuring the reconstructed knee or the contralateral knee. Majority of our patient who did not returned to pre injury level had left playing recreational sports as evident from tegner activity level

Conclusion

Seventeen patients returned to their pre-injury activity level whereas thirteen patient did not returned. The mean subjective IKDC score was 68.50% and patient who returned it was 70.85% and patient who did not returned was 65.42%. The mean Tegner activity level preinjury was 6.53 and post-surgery was 4.87. The mean Lysholm score in patient who returned was 94.71 and who did not returned was 87.08. The IKDC grade (A & B) in patient returned was 94.11% and patient who did not returned was 46.15%. 71.42% of patients who did not returned to pre-injury level was due to fear of re-injury.

Significant number of patients did not return to their pre-injury activity (43% patients) level due to psycho-social factors like morbid fear, social reasons like change of priorities and family and other commitments.

Limitation of our study

- Retrospective nature of our study design.
- Relatively small sample size.
- Study being more of subjective in nature, difficult to quantify and assess the activity level of patient return to pre-injury level.
- Short follow up period.
- The technical aspects of the study like choice of graft, instrument, and type of fixation has not been studied which might have bearing on the functional outcome.
- Different profile of our patients

Recommendations

Long term prospective study with large number of patient with varied profile is needed to draw conclusive evidence. Detailed psychosocial factor analyses and objective assessment tools are required to draw better conclusions.

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