

Effect of timing of surgery on the functional outcome of ACL reconstruction using hamstring graft



Medical Science

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ABSTRACT

This study was conducted on 30 patients suffering from ACL deficiency. Nature of the injury in our series was road traffic accidents in 16 (53.3%); sports in 6 (20%) comprising 74% of the patients. Giving way was the main presenting symptom (100%) in our study. Evaluation with Lachmann test under anaesthesia equates with arthroscopic evaluation (100%). All the cases underwent arthroscopic ACL reconstruction with quadrupled Hamstring tendon autograft. All were given Wilk et al., rehabilitation protocol for a period of 6 months from post-operative day 1. And the results were evaluated periodically at 16 wks, 20 wks and 24 wks. 87% of the patients were able to return to pre injury level of activity. Anterior knee pain in 6 patients; Swelling in 5 patients were the complication encountered in our study. Group I patients had better IKDC and Lysholm score test results when compared with GROUP II patient.

Introduction:

ACL injury has an annual incidence of more than 200,000 cases with ~100,000 of these knees reconstructed annually¹. The majority of ACL injuries (~70%) occur while playing agility sports and the most often reported sports are basketball, soccer, skiing, and football. An estimated 70% of ACL injuries are sustained through non-contact mechanisms, while the remaining 30% result from direct contact^{1,2}.

ACL injury is most prevalent (1 in 1,750 persons) in patients 15-45 years of age². More ACL injury cases occur in males due to greater numbers of male sports participants; however females have a higher risk of being injured. NCAA statistics found that female athletes are 2-8 times more likely to sustain an ACL injury playing sports^{2,3}.

The Anterior Cruciate Ligament is the weaker of the two cruciate ligaments and therefore it may tear easier than the Posterior Cruciate Ligament⁴. Anterior knee instability associated with rupture of the ACL is a disabling clinical problem. The ACL has a poor capacity for intrinsic repair. Thus patients who have knee symptoms related to ACL deficiency, may consider ligament reconstruction as a means of stabilizing the tibio-femoral joint and restoring high level function of the knee joint.

Some people can live without a functional ACL and not experience instability, such persons are usually referred to as 'copers'⁵. However, this usually requires a modification of the person's activity⁶, and some are not satisfied with their knee function⁷. Recurrent 'giving way' and secondary injuries to the menisci and cartilage are a risk with non-operative treatment^{8,5,6}. There are indications that ACL reconstructions decrease the risk of secondary injuries⁹. Recurrent 'giving way' episodes define a person as a 'non-coper', an indication for ACL reconstructive surgery.

Numerous authors have described successful reconstruction of the ACL with use of a donor autograft (patellar tendon, hamstring tendon or quadriceps tendon) and allograft (Achilles, patellar tendon, hamstring tendon or tibialis anterior) tendons. Anterior Cruciate Ligament Reconstruction has been attempted using Silver wire¹⁰, Fascia lata¹¹, and Iliotibial band¹². To date more than 400 different techniques have been described for Anterior Cruciate Ligament Reconstruction from open to arthroscopic technique¹³.

Anterior cruciate ligament (ACL) reconstruction with Hamstring tendon is becoming increasingly popular in patients with sympto-

matic instability and in appropriately selected patients can yield successful and satisfactory results¹⁴. Postoperative stiffness of the knee is a well-recognised complication of reconstruction of the anterior cruciate ligament (ACL)^{15, 16, 17}. In particular, early reconstruction after tears of the ACL has been associated with an increased incidence of stiffness and prolonged rehabilitation¹⁸.

The present study is designed to analyse the functional outcome of early and delayed reconstruction of the ACL in order to determine whether there was an advantage to early reconstruction.

Material And Methods:

This was a prospective study of 30 consecutive patients who underwent arthroscopic ACL reconstruction using quadrupled semitendinosus/gracilistendon autograft during the study period, July 2012 to May 2014, in NIMS Medical College and Hospital, Jaipur. We divided the patients into two groups

GROUP I : In whom early ACL reconstruction was done within 6 weeks from time of injury. In this group we included 15 patients.

GROUP II : In whom ACL reconstruction was done after 6 weeks from time of injury. In this group we included 15 patients.

All skeletally mature patients with ACL tear confirmed by Lachmann test with concomitant meniscal injury that required repair were included in the study. All patients with ACL avulsion injury or undergoing revision ACL reconstruction or with a concomitant musculoskeletal condition were excluded from the study.

All the 30 cases underwent arthroscopic ACL reconstruction with quadrupled Hamstring tendon autograft. In the postoperative period the ACL protocol adapted from Wilk et al. was taken into consideration and strict rehabilitation was followed. The patients are subjected to IKDC, Lysholm Scoring. The patients were followed up at 16 wks, 20 wks and 24 wks. Both the groups were compared and the results were tabulated for the same.

Results:

The mean age in our group was 34. There was a strong preponderance seen in our study with 86.7% of our cases being male. The majority of cases were seen on the right side (70%). Most common cause of ACL injury found in our study was RTA (53%). Most common presenting complaint was the feeling of giving way. All patients presented with the above complain. In table

I both the groups were evaluated in the postop period for the functional scoring using the IKDC scoring system. On application of Fishers chi square we find the value of Fishers Chi square is 5.447 with a p value of 0.049 which shows that there is a significant difference between Group I (<6 weeks) and Group II (> 6 weeks). Since the proportion of people who have normal IKDC score is more in Group I as compared to Group II so Group I is better. On comparing the groups in relation to the Lysholm Scoring the observations seen were tabulated in table 2. Application of chi square we find the value of Fishers Chi square is 2.688 with a p value of 0.344 which shows that there is no significant association between Group I (<6 weeks) and Group II (> 6 weeks). Most common complications seen on followup was the laxity of knee with 22 cases followed by anterior knee pain (6 cases) and swelling and pain on the graft site(5 cases).

Discussion:

Arthroscopic ACL reconstruction is performed to restore the functional stability in ACL deficient knees and to restore the normal kinetics of the knee. Harvest of semitendinosus/gracilis tendon autografts also yields fewer donors site morbidity than harvest of patellar bone- tendon- bone grafts and carries no risk of patellar fracture; however remote technical factors, specifically the absence of adequate fixation techniques, initially limited the use of hamstring grafts for ACL reconstruction. New techniques focus on optimizing graft strength and stiffness.

Timing of ACL Reconstruction has been a controversial issue since many years. Some authors have suggested early reconstruction leads to knee stiffness while delayed reconstruction leads to secondary meniscal tear, potential graft morbidity leading to delayed in return to activities of daily life. In this study we have compared the functional results of early and delayed reconstruction and complication of ACL Reconstruction using graft after semitendinosus/gracilis tendon at 6 month of follow up.

In the present study Lachmann test and Anterior drawer test was found to be positive in all the patients with 50% patients of grade 3 and 50 % in grade 4 by clinical examination while pivot test was positive in 60% cases. On evaluation under anaesthesia, Lachman test was found positive in 11 (36.66%) patients with grade 3 and 19 (63.33) with grade 4. Anterior drawer test was found positive in all the patients with grade 3 in 9(30%) patients and grade 4 in 21(70%) patients. Pivot test was found positive in 29 (96.66%) patients.

In present study all patients were assessed using the IKDC score and Lysholm score to evaluate for symptoms and sign of knee function. On comparing our study with the studies done previously the data was found to be quite similar as seen in table 3. The studies compared with our current study are Fareed H et al¹⁹ and K button & Others²⁰. In their study, a satisfactory outcome was seen in 96% & 92% respectively while it was 90% in our study. In the LGS system 36.66% [11 patients] had an excellent outcome while 36.67% [11 patients] had a good and 26.67% [8 patients] had a fair outcome. Quite similarly, 53.33% [16 patients] were very satisfied as per the subjective questionnaire and 43.33% [13 patients] were satisfied. Only one patient was dissatisfied. This was probably due to the fact that most of the patients were keen on normal day to day activities than return to sports. All three scoring systems had a very high correlation as evidenced by the Kendaltau values ranging from 0.647 to 0.923. Statistically, this was found to be highly significant [p value 0.000-0.0001]. 87% of the patients were able to return to the pre-injury activity level.

In the present study swelling was in 16.66% of cases and clicking in 6.7% of cases on post-operative follow up. Pain at graft site was seen in 16.66% of cases. Wound infection seen in 2 cases only. Numbness was seen in one patient who was resolved by itself and FFD was also seen in one case that did not follow the physiotherapy regimen. In our study there were no complications such as

knee instability, graft failure or distal femoral fractures.

According to the literature, it is recommended that the surgical intervention be performed at more than three weeks from the occurrence of the trauma (the patients so operated had better post-operative results with greater motion ranges, which were obtained faster than in the case of the patients operated during the acute phase, 1-3 weeks post traumatically, and did not require a surgical reintervention for the stiffness of the knee²¹. In the present study , on observing the correlation between Group I & Group II and IKDC score it was found that in group I 73.33% of patients were graded as normal and in group II only 40% graded as normal. In group I 46.66% of patients were graded as excellent on Lychman score. In group I mean post-operative Limb symmetry index was 84.49. Petersen W et al in their study showed Mean Lysholm score of 85.3% in early group and 89.9% in late group²².

The patients with early reconstruction were more satisfied with their knees than the patients with late reconstruction. Also the former patients had less pain and functional limitations and could return to more strenuous athletic activities than those with the late reconstruction. As such, these findings were not surprising, because patients with late reconstruction had suffered from pain, swelling, decrease post-operative range of motion and more associated secondary meniscal injuries.

The above noted findings thus support the concept that the ACL reconstruction needs to be done before degenerative changes of the knee develop and this may best concern athletically active persons. In fact, the concept of reconstruction in the acute phase has become popular in some centers in central Europe, especially in the alpine countries, with good results.

Conclusion:

This study was conducted on 30 patients suffering from ACL deficiency in the age group of 20 - 40 years. All patients had instability of knee in the form of giving way evaluated by Lachman test and confirmed by arthroscopy. Our results showed that an ACL reconstruction using a quadrupled semitendinosus/ gracilis tendon graft leads, in general, to good ligamentous stability and function of the knee. It may also prevent the later-life degenerative changes of the tibiofemoral joint. The functional outcome of anterior cruciate ligament reconstruction with quadrupled semitendinosus/ gracilis tendon autograft is good to excellent in majority of the cases. Patients with delayed reconstruction had majority of complications like anterior knee pain, swelling, reduced post-operative range of motion and poorer IKDC, lysholm. Patients with an early ACL reconstruction were more satisfied with the end result, had fewer symptoms, and could return to sports activities more often than the patients with a late ACL reconstruction. Therefore, the surgery should be carried out before the onset of the late-phase symptoms (such as osteoarthritis), but probably not during the very first weeks after the injury because of the increased risk of adhesion formation and arthrofibrosis.

Table 1: Correlation between Group I & Group II with IKDC score

Groups	IKDC			P value
	Normal	Near Normal	Abnormal	
Group I (< 6 weeks)	12 80%	3 20%	0	0.019
Group II (> 6 weeks)	5 33.33%	7 46.66%	3 20%	

Table 2: Correlation between Group I & Group II with LGS score

Groups	LGS			P value
	Excellent	Good	Fair	
Group I	8 53.33%	6 33.33%	2 13.33%	0.344
Group II	3 20%	5 33.33%	6 40%	

Table No. 3: Comparison of our study with Fareed H et al and K Button & others

	Fareed H et al ¹⁴¹	K button & Others ¹⁴²	Present study
Number of patients	25	48	30
Average follow up	25.4 weeks	20 weeks	24 weeks
IKDC Normal	12(48%)	26(54%)	17(56.66%)
Near normal	12(48%)	18(38%)	10(33.33%)
Abnormal	01(4%)	04(8%)	03(10%)

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