



ACCELERATED REHABILITATION VERSUS CONVENTIONAL REHABILITATION AFTER ACL RECONSTRUCTION: A COMPARATIVE STUDY.

Orthopaedics

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ABSTRACT

Objective: To know whether accelerated or conventional rehabilitation is effective after Anterior Cruciate ligament reconstruction.

Material & Methods: 30 subjects were selected who fulfilled the predetermined inclusive and exclusive criteria. The subjects were divided into two groups, 15 in each group. Group A underwent Accelerated Rehabilitation and Group B underwent Conventional rehabilitation post ACL surgery. Visual analogue score (VAS) and Knee injury and osteoarthritis outcome Score (KOOS) was used as a measure of pain and function respectively.

Results: Reduction in pain and improvement in function following rehabilitation is seen in both the groups. There is significant difference in VAS ($p < 0.001$) and KOOS ($p < 0.001$) in group receiving accelerated rehabilitation following ACL reconstruction.

Conclusion: Accelerated rehabilitation is effective over conventional rehabilitation post ACL surgery.

KEYWORDS

Anterior cruciate ligament, accelerated rehabilitation, conventional rehabilitation.

INTRODUCTION

The anterior cruciate ligament is one of the four main ligaments of the knee, and the ACL provides 85% of the restraining force to anterior tibial displacement at 30 degrees and 90 degrees of knee flexion.⁽¹⁾ Anterior cruciate ligament (ACL) reconstruction is a surgical tissue graft replacement of the anterior cruciate ligament, located in the knee, to restore its function after anterior cruciate ligament injury. The ACL can be injured if the knee joint is hyperextended, rotated, or quickly shifted laterally or if any of these things occurred simultaneously.⁽²⁾ The torn ligament is removed from the knee before the graft is inserted. The surgery is performed arthroscopically.

Rehabilitation after ACL reconstruction plays a major role in the functional outcome of the extremity.^(3,4,5,6,7) Protocols for rehabilitation programs^(8,9,4) focus on range of motion, weight bearing, strength recovery and functional return to activities. The protocols that have been published vary as far as prescribed length of rehabilitation and expected rate of recovery.^(8,9,4,10,6,7)

The concept of accelerated rehabilitation following intraarticular ACL reconstruction has recently been described in the literature.⁽¹¹⁾ Researches has been typically centered around the work of few physician and their individual philosophy of treatment, with detail on the accelerated rehabilitation time frame post reconstruction. The purpose of this study is to compare the effectiveness of conventional rehabilitation versus accelerated rehabilitation following ACL reconstruction.

MATERIAL AND METHODS

This study was a prospective comparative study conducted in the year 2019-2020 at Physiotherapy department of Narayana medical institutions, Nellore. Patients of both the sexes within the age group of 20-40 years with day 1 of post operative unilateral ACL reconstruction with autologous hamstring tendon graft with healthy contralateral knee and with no history of reinjury during follow up period were included in the study.

Patient with revision ACL reconstruction, diagnosed concomitant knee injury, advanced osteoarthritic changes in knee or with associated hip or ankle injury were excluded from the study.

A total number of 30 subjects who underwent ACL reconstruction were selected based on inclusion and exclusion criteria. After the informed consents obtained, they were divided into 2 groups of 15 each as Group A for Accelerated Rehabilitation and Group B for Conventional Rehabilitation. Prior to the treatment, pain and functional status of both the groups were assessed using VAS and KOOS scores respectively.

The Visual Analog Scale (VAS) is a tool widely used to measure pain. A patient is asked to indicate his/her perceived pain intensity along a 100 mm horizontal line, and this rating is then measured from the left edge.⁽¹²⁾ The KOOS is a knee-specific instrument, developed to assess the patients' opinion about their knee and associated problems.

The KOOS evaluates both short-term and long-term consequences of knee injury. It holds 42 items in 5 separately scored subscales; Pain, other Symptoms, Function in daily living (ADL), Function in Sport and Recreation and knee-related Quality of Life (QOL).⁽¹³⁾

After a brief demonstration about accelerated and conventional rehabilitation protocol, the group A and B respectively, were subjected to do the same for a period of 3 months.

Rehabilitation protocol involves five phases of supervised rehabilitation exercises including range of motion exercises, isometrics muscle strengthening followed by isotonic strengthening, balance and proprioceptive training, functional training, agility drills, plyometrics and sports specific training before allowing to return to sports.

Figure 1: Various exercises at different phases of rehabilitation following ACL reconstruction.





STATISTICAL ANALYSIS

Categorical variables were presented in number and percentage (%) and continuous variables were presented as mean $\pm$ SD and median. Normality of data was tested by Kolmogorov-Smirnov test. Quantitative variables were compared using repeated measure unpaired t-test between the two group. A p value of <0.05 was considered statistically significant. The data analysis was done using Statistical Package for Social Sciences (SPSS) version 21.0.

RESULT

30 subjects those fulfilled the predetermined inclusive and exclusive criteria were divided into two groups of 15 each. Mean age of the patients in both the groups were around 40 years. Group A underwent Accelerated Rehabilitation and Group B underwent Conventional rehabilitation.

The pain and functional levels were evaluated using VAS and KOOS scores at day 1 following surgery and at 3 months following surgery and rehabilitation. This study shows the pain (VAS) and KOOS is significantly decreased in both the groups ($P < 0.0001$) after 3 months of rehabilitation. But when we compared the effectiveness of accelerated rehabilitation over conventional rehabilitation, it was found that accelerated rehabilitation is significantly better ($p < 0.001$) in decreasing pain and improving function after ACL reconstruction.

Table 1: Unpaired t-test for VAS and KOOS score before and after rehabilitation in both the groups.

	Group	N	Mean	STD. Deviation	p-value
Pre- VAS	A	15	6.267	0.799	0.003
	B	15	7.2	0.775	
Post- VAS	A	15	2.067	0.704	<0.0001
	B	15	4.133	0.99	
Pre- KOOS	A	15	74.53	2.85	0.001
	B	15	79.47	4.24	
Post- KOOS	B	15	23.4	1.993	<0.0001
	B	15	29.67	1.988	

DISCUSSION

The purpose of this study was to find out the effect of Conventional Rehabilitation versus Accelerated Rehabilitation on patients with ACL Reconstruction. Conventional Rehabilitation is a form of rehabilitation mainly used after ACL Reconstruction to reduce pain and to restore ROM and strength. This is accomplished by isometrics, active assisted and resisted exercises.

Results shows that Conventional Rehabilitation on ACL Reconstruction relieved pain with a significant difference (p-value 0.0001). This may be due to prolonged immobilization and icing. When performing a study on Group B patients some of the patients told that there is reduction in intensity of pain after 24 hours of the first day treatment.

Accelerated Rehabilitation is mainly used to improve Quality of Life by restoring the functional activities of the patient after ACL reconstruction. This is accomplished by Balancing, Proprioceptive, Agility and Pylometric Exercises along with ROM and strengthening Exercises. K. Donald Shelbourne stated that, Accelerated Rehabilitation protocol emphasizes extension, in contrast to immobilization in

flexion and restrictions on extension outlined in the past. He intentionally made this change because we had observed through the years that after the patient returns to sports participation, extension loss frequently resulted in patient dissatisfaction secondary to extremity pain and fatigue. The benefit of obtaining early full extension is reflected in the significant decline in the number of patients who required surgical management for symptomatic extensor loss.⁽¹¹⁾

Frank R. Noyes, MD concluded that early progressive weight bearing, protected functional exercise (mini- squats, etc., rather than weighted, flexed heavy resistance exercises) and early return of flexion showed better improvement in post ACL reconstruction patients.⁽¹⁴⁾

There is reduction of pain in Group A as well as Group B subjects. As this study also showed significant difference in pain and function between the Group A and Group B, who underwent accelerated and conventional rehabilitation respectively may be because of early mobilisation. This study showed that Accelerated Rehabilitation is effective in relieving pain and restoring functional activities after ACL Reconstruction.

CONCLUSION

Based on the results, this study concludes that both Accelerated Rehabilitation and conventional rehabilitation showed better results. But when we compare both, Accelerated Rehabilitation is more significant in form of reducing pain by measuring VAS score and also improving in functional activities by measuring KOOS Questionnaire. Hence, this study suggests Accelerated Rehabilitation is effective for ACL Reconstructions.

REFERENCES

1. Ellison A, Berg E. Embryology, anatomy, and function of the anterior cruciate ligament. Orthop Clin North Am 1985;16:3-14. PubMed Abstract.
2. Anterior Cruciate Ligament (ACL) Injuries". www.webmd.com. Retrieved 25 April 2016
3. Arms SW, Pope MH, Johnson RJ, et al: the biomechanics of anterior cruciate ligament rehabilitation and reconstruction. Am J sports Med 12: 8-18, 1984.
4. Brewster CE, Moyens DR, Jobe FR: Rehabilitation of Anterior Cruciate reconstruction, J Orthop Sports phys Ther 5:121-126, 1983.
5. Feagin JA: The syndrome of the torn Anterior cruciate ligament. Orthop clin North Am 10:81-90, 1979.
6. Noyes FR, Butler DL, Grood ES, et al: Biomechanical analysis of human ligament grafts used in knee ligament repairs and reconstructions. J bone Joint Surge 66a:344-352, 1984.
7. Walla DJ, Albright JP, Mc Auley E, et al: hamstring control and the unstable anterior cruciate ligament- deficient knee. Am J Sports Med 13:34-39, 1985.
8. Antich TB, Brewster CE: Rehabilitation in the non reconstructed anterior cruciate ligament - deficient knee. Clin Sports Med. 7:813-826, 1988.
9. Blackburn TA: Rehabilitation of Anterior cruciate ligament injuries. Orthop Clin North Am 16:241-269, 1985.
10. Clancy WG, Ray M, Zoltan DJ: Acute tears of the Anterior cruciate ligament, Surgical vs Conservative treatment. J Bone Joint surge 70 A 1483-1488, 1988.
11. Shelbourne KD, Nitz PA: Accelerated rehabilitation following anterior cruciate ligament reconstruction. Am J Sports Med 18:292-299, 1990.
12. McCormack HM, Horne DJ, Sheather S. Clinical application of visual analogue scales: a critical review. Psychol Med 1988;18:1007-19.
13. Collins NJ, Roos EM. Knee injury and osteoarthritis outcome score (KOOS): Systematic review and meta-analysis of measurement properties. Osteoarthritis and cartilage. 2016; 24(8):1317-1329.
14. Paulos L, Noyes FR, Grood E, Butler DL. Knee rehabilitation after anterior cruciate ligament reconstruction and repair. The American Journal of Sports Medicine 1981;9(3):140-149.