

Sports Rehabilitation in Patient with Anterior Cruciate Ligament (ACL) Reconstruction - A Case Study

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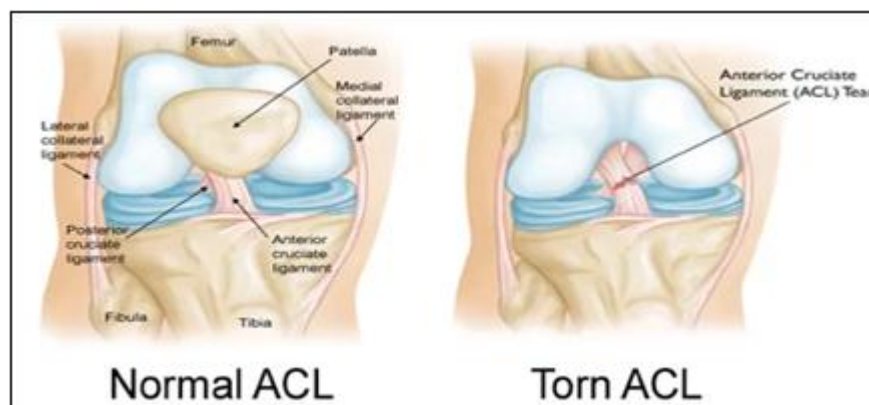
Abstract: ***Objective:** To determine the effectiveness of sports rehabilitation in a patient with Anterior Cruciate Ligament (ACL) reconstruction. **Materials and Method:** The study includes a patient of age 18 years with ACL Reconstruction on the right knee joint, an exercise protocol was followed in the form of physiotherapy treatment and exercises were done on a regular basis. **Result:** In this study, pain reduction, improvement in range of motion and being able to do activities of daily living along with return to sports after giving regular physiotherapy management, was observed. **Conclusion:** This study concluded that after receiving physiotherapy treatment in particular, multiple functional measurements in a time series approach to determine the actual rehabilitation focus seems promising.*

Keywords: Anterior cruciate ligament (ACL), Rehabilitation, Range of motion, Protocol, Return to Play

1. Introduction

Knee is the largest and most complex joint of the body surrounded by 11 ligaments. [1] The ligaments reflect their importance for knee joint stability and the frequency with which joint function is disrupted through injury. Anterior cruciate ligament (ACL) functions as the primary restraint against anterior translation of tibia on femur. It is also responsible for resisting the hyperextension of the knee joint. Moreover, it provides rotatory stability to the knee

during medial/lateral rotation, varus/valgus angulations and their combinations. Also, Anterior cruciate ligament (ACL) has relatively 10% injury rates among female athletes of 14 to 18 years. (4) A rupture of the ACL is a serious hazard for health and career advancement in sports. The severe potential consequences highlight the importance of a rehabilitation process focusing on a safe return to sports procedure with a low risk for re - ruptures and secondary health problems. (3)



ACL injury can be of 2 types - contact and non - contact injury. Contact injury mechanism is a force applied to the lateral side of the knee resulting in large valgus movement. Non - contact injury occurs through a rotational mechanism in which the tibia is externally rotated on the planted foot. In a sustained non - contact ACL injury, women are 3 times more prone to injury than men (3).

Patient History:

This case presents the study of an 18 years old female who met with a noncontact sports injury while playing football on field. The patient got tripped and fell on the ground during a field match. Investigations showed a grade 3 ACL tear. Patient was operated arthroscopically by Quadriceps

Tendon Graft and then physiotherapy treatment was started in the form of rehabilitation.

Pain Assessment:

Pain was assessed using NPRS (numerical pain rating scale) with scores 2/10 at rest and 6/10 on activity. Movements being the aggravating factor, while ice pack and rest acted as relieving factors.

Evaluation:

On examination, the patient's vitals were normal. Sensory examination was intact. On motor examination, the Range of motion of knee flexion was 40 degrees with quadriceps lag in knee extension along with decrease in patellar mobility. The muscle strength of quadriceps and hamstrings

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were grade 3/5 as per manual muscle testing. Knee Outcome Survey Sports Activities Scale (SAS) was taken before starting the treatment, on the day of treatment; in the form of outcome measure. Brace and walker were given in the form of external appliances, and the patient was allowed to bear weight while walking as much as possible.

Physiotherapy Management

Weeks: 1 - 3:

- Physiotherapy treatment began with PRICE protocol (i. e. protective bracing, rest, ice, compression and elevation) to decrease pain and inflammation.
- Muscle setting exercises for quadriceps and hamstrings along with hip muscles were given to prevent reflex inhibition of musculature.
- Active assisted exercises were given for the knee in the form of supine straight leg raise and supine active knee bending to restore knee mobility.
- Ankle pump exercise was done to prevent secondary vascular complications.
- Patellar mobilization was given to improve patellar mobility.
- Supported gait training began.
- Active range of motion exercises in contralateral limb for hip, knee and ankle were given to maintain mobility and strength. (3)

Weeks 3 - 6:

- Low intensity, active exercises were continued along with multiple angle isometrics of knee musculature with emphasis on co contraction of quadriceps and hamstrings.
- Open chain exercises were started in the form of terminal knee extension, straight leg lowering and hamstring curls.
- Clamshell exercise was also started.
- Weight shifting activities.
- Stationary cycle was started as a non - resisted multi joint movement.
- Progressive resistance exercise was given according to 10 RM.
- Closed chain exercises against body weight began in the form of bridging, wall slides, partial squats, marching, lunges, step up, step down, heel raise and toe raise. (3, 9)

Weeks: 6 - 12:

- Progression from double leg to single leg stance.
- Proprioceptive and balance training was initiated on balance board and bosu ball.
- Gait training on a stable surface progressed to an unstable surface; obstacle walking, tandem walking along with stair climbing was started.
- Unilateral closed chain terminal knee extension with theraband was begun.
- Resisted mini squats and step ups using elastic resistance. (3, 9)

After 12 weeks:

- Lunge walking: Forward and Side lunges.

- Eccentric exercises of hamstrings, quadriceps and calf muscles were given for movement control.
- Exercises were progressed on an unstable surface to improve the stability.
- Plyometric and agility exercises were given in form of theraband resisted jumps, box jumps, hoping exercises, side stepping, shuffling, time - stressed positional changes, split jumps, pop squat, split squat jump, reverse lunge to knee up jump, skater hop, single leg deadlift to jump, lateral lunge to single leg hop. (5, 6, 7, 8).
- Exercises were progressively increased with the intensity and/or repetitions.
- The assessment of health risk, activity risk and risk tolerance was taken according to StARRT framework which showed positive results and the patient was now allowed to return to sports.

Outcome Measure

- Knee outcome survey sports activities scale (SAS) was taken as an outcome measure along with baseline characters such as range of motion, muscle strength and return to sports criteria and it shows a significant increase in pre and post rehabilitation data.
- The SAS scale shows increased activity level in post rehabilitation data as compared to pre rehabilitation measurement data (figure1).

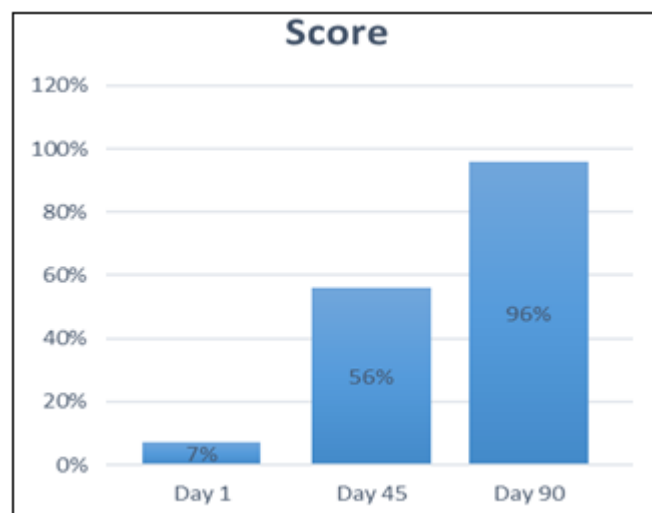


Figure 1: Knee Outcome Survey Sports Activities Scale (SAS)

2. Conclusion

The athlete successfully returned to sports after 6 months of Rehabilitation. The pain score was significantly reduced, along with the SAS score also showing significant improvement (96%) in sports activities of the patient. The results of this study indicate that a treatment timing and focus on return to daily activity of patients results in improvements in function and biomechanics after ACL reconstruction, and is feasible and safe to complete. The study concludes that physiotherapy plays an important role in treatment of ligament reconstruction, and injuries too.

Acknowledgement

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Conflict of Interest

There is no personal or institutional conflict of interest for this study.

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