CASE REPORT

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Impact of Physiotherapy rehabilitation program on postoperative ACL tear patient on prognosis leading to maintain consistency in sport

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ABSTRACT

Anterior cruciate ligament (ACL) injury is a devastating injury that occurs at high frequency during involvement in competitive sporting activity. Typical treatment of ACL damage is a reconstruction of the anterior cruciate ligament (ACLR). It is projected that between 50 percent and 60 percent of ACL injured athletes will return to competitive sport. Athletes undergoing ACLR surgery are recommended for comprehensive rehab and preparedness to rebuild knee joint integrity and specific functional criteria to direct the comeback to sport to protect against secondary ACL damage. Patient main concerns were pain, with loss of strength and stability at the knee joint, the clinical findings found that there was a marked decrease in range of motion (ROM), and decreased strength of the quadriceps and the hamstrings. Diagnosis of case was grade 2 ACL tear which was confirmed by the MRI reports. The patient showed a great co-operation during the intervention period and now the subject is able to maintain his consistency in his sport. The outcome measures of physical therapy intervention progressed him in an enhanced athlete with return to his sport.

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INTRODUCTION

Anterior tearing of the cruciate ligament (ACL) is one of the most severe knee ligament injuries. The ACL tear exact cause has been hugely complex (Prabhakar et al., 2019). Typical treatment of ACL damage can be reconstruction of the anterior cruciate ligament (ACLR) (Paterno et al., 2012). Athletes undergoing ACLR surgery are recommended for comprehensive rehab and preparedness to rebuild knee joint integrity and specific functional criteria to direct the comeback to sport to protect against secondary ACL damage (Jordan et al., 2020). Tearing of the anterior cruciate ligament (ACL) is one of the most common knee ligament injuries. The ACL tear etiology has proved to be multifactorial. The precise etiopathogenesis of ACL tear is also incompletely known, given the recognition of numerous intrinsic and extrinsic risk factors associated with ACL tears. ACL tear has a complex, multifactorial etiology; several study groups have indicated an association between predisposing genetic factors, environmental and intrinsic risk factors. The anterior cruciate ligament, or ACL, is a knee structure that helps to regulate both anterior tibia movement on the femur and knee joint rotation. While ACL accidents are one of the most excellently-researched sports accidents till date, there are also various discussions on effective medical procedures to these casualties, including non-operative vs. surgical, surgical as well as graft types (Aoyama et al., 2017). Symptoms rely on the duration of the after-trauma
assessment: in extreme situations, patients can report a fall or even weight-bear loss. Patients can sometimes report that they are unable to completely stretch and/or flex the leg, uncomfortable motions, experiencing tension in the joint and often locking. The ACL is primary anterior restriction Tibia translation, and the highest ligament contribution is at 30 degrees Flexion (Siebold and Kardakis, 2016; Butler et al., 1980). In non-contact circumstances, general 50–80 percent of ACL injuries occur (Arendt et al., 1999; Boden et al., 2000; Cochrane et al., 2007); hence, patients can identify a pivoting pattern of fixed foot injury, sudden deceleration or hyperextension (Siebold and Kardakis, 2016).

MATERIALS AND METHODS

Patient information
A case of 17-year-old basketball player who met with an injury while playing a basketball match and later it was found that he was having a grade 2/3 ACL tear. As per the history given by the patient, he first managed the injury conservatively with anabolic steroids but was unable to manage the pain and therefore was operated for arthroscopic reconstruction of ACL with semitendinosus graft one year later, and then the patient came for the rehabilitation post ACL reconstruction surgery.

Clinical findings
After the physical evaluation of the injured leg, it was discovered that owing to discomfort, the individual was unable to completely flex the leg and move into the duck waddle stance and therefore was unable to take further action. Over the right knee motion phase, flexion consciously repeated the chief problem at the end stage, with passive overpressure into deep bending exacerbating discomfort for the individual.

However, the patient verbally indicated that before surgery discomfort with passive overpressure at the end range and laxity was observed when opposed to the right knee with related muscle guarding.

Resisted muscle examination of the right hamstring was positive for the major symptom of knee pain and was rated 2/5 with associated discomfort giving way to fatigue.

During the anterior drawer, laxity was observed in the right knee when opposed to the left knee with muscle protection, and a pain reaction was observed for the main complaint.

Knee palpation was unremarkable for the tenderness of the joint surface and for the lateral and medial collateral ligaments, distal quadriceps tendon and biceps femoris, semitendinosus and semimembranosus. Following physical inspection, the patient indicated intensified pain and discomfort. A presumed right ACL 1st grade sprain with possible joint effusion has been identified based on the background and physical examination. A presumed right ACL 1st grade sprain with possible joint effusion has been identified based on the background and physical examination Figures 1 and 2.

Physiotherapy Intervention

Phase 1: - Immediate postoperative days 1-7
Reducing swelling and discomfort around joint.
To enhance knee flexion.
Full passive knee extension restoration.
Increase quadriceps strength.
Make the patient independent.

Brace: Transitional hinge brace is used in full extension.
Weight-bearing is given through the help of walker.

Exercises: - Ankle pumps (10 rep), Complete passive knee extension by giving overpressure. Self and therapist assisted knee flexion (90° up-to day 5). Straight Leg Raised Exercise (5 Rep-flexion, abduction, adduction), Quadriceps isometric exercise and hamstring stretch. 30-degree mini-squats or wall squat and weight shifts, proprioception and balance training by standing on one leg with help of support.
Continuous Passive Motion: - 0-45/50 degrees to increase the ROM.

Phase 2: Early rehabilitation- till 2nd-4th week
Keep constant ‘passive knee extension’.
Slowly improve ‘knee flexion’.
Reduce bulging and discomfort.
Physical activity to the musculature.
Proprioception is restored.
Mobility for patella.

Week 2
Brace: Discontinue when the patient tolerates the condition at 2-3 wk.
Weight-bearing: Discontinue the walker after 10 days of surgery.
Range of Motion: Full ROM should be maintained passively and 4-5 times stretching exercises should be done regularly.

Exercises: Static quadriceps training (10 reps). • Straight Leg Raised exercise (5 reps), extension of
Figure 1: Lateral view radiograph of right leg

Figure 2: Antero-posterior view radiograph of right leg
knee 90-40 degrees, Half Squat (0 to 40 degrees), weight shift with the support to wall, front and side lunges (3 reps), Half bicycling, hamstring curls, patellar mobilization and resistance exercise for progression (begin with 1 pound and addition of 1 pound each week).

Cryotherapy: icing for 20min and elevation of limb above heart level.

**Week 3**

Range of Motion (ROM): Resume arc of motion, elongation of muscles and extra pressure is given.

Training program: Carry on the previous training of 2nd week, Passive ROM 0-115 degrees must be increase, Bicycling for range of motion and endurance, program for eccentric quadriceps 40-100°, side lunges (5 reps), side and front steps-ups simultaneously(5 reps), progress proprioception drills and neuromuscular regime.

**3rd phase: Ambulation control, 4th – 10th week**

Maintain complete range of motion of knee (0-125 degrees).

Swelling Control

Strengthen the lower extremity.

Improve muscular control, proprioception, neural control and balance.

Preserve limb attitude and its functionality.

Range of Motion: Self-ROM (four to five reps everyday with the help of non-affected leg to maintain functionality, focus on maintaining 0° extension passively.

**Week 4**

Exercises: Improve static strengthening program, extension of knee 90-40° (10 reps), Hamstrings strengthening (10 reps) and movement of hip towards and away from the body (10 reps), bending of hip and extension (10 reps), Bicycling to increase cardiac fitness and to improve range of motion, Lateral lunges(10 reps), Lateral steps-up and front steps-ups(10 reps), progress proprioception drills and neuromuscular drills, Front step down, Wall squat and Vertical squat and toe calf raises.

**Weeks 6**

All above exercises will continue with agility drill and balance on tilt boards.

**Week 8**

All above exercises will continue with basic plyometric. Isokinetic exercise to increase the range of motion from 120 to 140 degrees. Bicycling for endurance training along with stretching.

**Week 10**

All above exercises will continue with basic plyometric. Isokinetic exercise to increase the ROM up to 120-140°. Bicycling for endurance training along with stretching.

**Phase 4: Advanced Activity-10th to 16th week**

Strengthen the lower extremity normally.

Increase power of muscle and the ability to endure.

Increase muscular stability.

Selected sport specific drills should be performed

Exercise: training should be continued with gradually increase in intensity.

**Phase 5: Resume to sports specific training-week 16-22**

Slowly comeback to all sports which should be unrestricted.

Reach and maintain the power and endurance

Neuromuscular control should be normalized

Advancement of skill program.

Exercises: exercises for strengthening should be maintained, muscular and neural control program, carry-out lower extremity drills, to improve speed and sudden change in direction training, training should be sport-specific.

**RESULTS AND DISCUSSION**

The risk factors that lead to the diagnosis of arthrofibrosis are not well established, but can include a diminishing preoperative mobility, bad surgical procedure with bone tunnel malposition or insufficient postoperative recovery. Results indicate that arthrofibrosis therapy is an uncommon condition following ACL damage and eventual ACL reconstruction. After restoration of ACL, arthrofibrosis is still uncommon but potential catastrophic condition, and around 2% of patients suffer from post-operative stiffness that needed treatment. Women suffering from arthrofibrosis are at elevated risk. Nonetheless, when patients experience serious complications of motion following damage to ACL, treatments appear to be successful in avoiding permanent arthrofibrosis (Sanders et al., 2017). Physical rehabilitation plays an significant part in the healing of these patients, as multiple trials have been conducted to endorse therapeutic recommendations that need to be implemented, allowing successful and revised care that can address injuries, normalize static mobility and unstable knees, and to restore them in the briefest practicable period, yet in an extremely safe way. The decreased frequency of
joint rigidity in these post-operatives contributed to additional trials and treatment modifications. The first therapies, entitled traditional the protection for graft limiting movement was emphasized and the time-lapse activities increased (do Carmo Almeida et al., 2016). After ACL rehabilitation, younger and male soccer players are more likely to return to play. After ACLR decreases over time, back to soccer. ACLR on the no-dominant limb possibly presents a danger to the dominant limb for possible ACL injury (Brophy et al., 2012).

CONCLUSIONS

Patient showed a great co-operation during the intervention period and now the subject is able to maintain his consistency in his sport. The outcome measures of physical therapy intervention progressed him in an enhanced athlete with return to his sport.

List of abbreviations

1. ACL- Anterior Cruciate Ligament
2. ACLR- Anterior Cruciate Ligament Reconstruction
3. ROM- Range of Motion
4. MRI- Magnetic Resonance Imaging

Authors contribution

All author made best contribution for the concept, assessment and evaluation, data acquisition and analysis and interpretation of the data.

Conflict of Interest

None.

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Patient consent

A proper consent from the patient was taken for writing the case report.

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