Case Report

Conservative Rehabilitation of Partial Anterior Cruciate Ligament Tear For Better Functional Outcome

Gayatri Kaple, Ragini Dadgal, Sakshi P. Arora, Waqar M. Naqvi

Ravi Nair Physiotherapy College, Datta Meghe Institute of Medical Sciences, Wardha, Maharashtra, India.

ABSTRACT
To stabilize the knee joint, the anterior cruciate ligament (ACL) is one of the important ligaments. For normal movement and mechanics of the knee joint, ACL is important. If the ACL is torn, people notice problems in stability function of knee joint and there is the feeling of ‘giving away’ while weight bearing. The function of anterior cruciate ligament is to restrain translation of the tibia on the femur. However, this role is divided by either anteromedial or the posterolateral bundle, depending on the knee flexion angle. The posterolateral bundle is stretched when the knee is close to full extension; as the knee flexes, the posterolateral bundle loosens and the anteromedial bundle becomes tight. In this report, a 32-year-old male who had a history of twisting of the leg while jogging, started by him since 40 days, lead to partial thickness tear of ACL, minimal joint effusion along the periarticular surface of the right knee and was diagnosed by radiological findings and MRI. As patient was not ready for surgery, he decided to opt for physiotherapy management. The aim of this study is to study effects on functional outcomes after physiotherapy rehabilitation of ACL injury without any invasive procedure.

Keywords: Partial Anterior Cruciate Ligament Tear, Joint Effusion, Periarticular Surface, Twisting, Conservative Management.

INTRODUCTION
For nearly half of the knee ligament injuries anterior cruciate ligament (ACL) injury is a common traumatic injury during sports activities. In almost 10 to 27% of ACL injury, a partial ACL tear is a frequent pattern, observed of isolated ACL lesions [1]. Conservative management may be beneficial for the patient since it preserves biomechanical, vascular, and proprioceptive advantages. During the healing process, the non-injured fibers function as grafts. The vascularization of the ACL augmentation may be aided by the presence of peri-ligamentous and endo-ligamentous vessels in the native ACL tissue. The intact mechanoreceptors residual ACL fibers may have a proprioceptive function [2]. Many patients with a partial ACL tear will be able to resume their previous level of everyday activities without experiencing buckling, instability, or giving away. It could, however, take a long time to recover from the injury and is also necessary to complete the rehabilitation program [3]. A partial ACL tear is described by a positive Lachman’s test and a positive anterior drawer test with a firm endpoint, as well as small differential laxity, MRI findings of hyper-intensity within the ACL fibers, and arthroscopic findings of a partial tear [1].
observed to have swelling. On palpation, tenderness was evident along the medial joint line of the right knee joint (Grade 2). He also had pain with 6 on NPRS.

### Table 1. Assessment of Strength

| Joint   | Right | Left |
|---------|-------|------|
| Hip     |       |      |
| Flexors | 3+    | 4+   |
| Extensors | 3-  | 4+   |
| Abductors | 4+   | 4+   |
| Adductors | 4+   | 4+   |
| Knee    |       |      |
| Flexors | 2+    | 4+   |
| Extensors | 2-  | 4+   |
| Ankle   |       |      |
| Plantarflexors | 3+ | 4+ |
| Dorsiflexors | 3+ | 4+ |
| Invertors | 3+   | 4+   |
| Evertors | 3+    | 4+   |

### Table 2. Assessment of range of motion

| Joint      | Right active | Right passive | Left active | Left passive |
|------------|--------------|---------------|-------------|--------------|
| Hip        |              |               |             |              |
| Flexion    | 0-100°       | 0-105°        | 0-115°      | 0-120°       |
| Extension  | 0-15°        | 0-20°         | 0-25-       | 0-30°        |
| Abduction  | 0-35°        | 0-40°         | 0-40°       | 0-45°        |
| Medial rotation | 0-25° | 0-30° | 0-40° | 0-45° |
| Lateral rotation | 0-25° | 0-30° | 0-40° | 0-45° |
| Knee       |              |               |             |              |
| Flexion    | 0-90°        | 0-95°         | 0-120°      | 0-125°       |
| Extension  | 90-0°        | 95-0°         | 120-0°      | 125-0°       |
| Ankle      |              |               |             |              |
| Plantarflexors | 0-25° | 0-30° | 0-45° | 0-50° |
| Dorsi flexion | 0-10° | 0-15° | 0-15   | 0-20°     |
| Inversion  | 0-25°        | 0-30°         | 0-30°       | 0-35°        |
| Eversion   | 0-05°        | 0-10°         | 0-10°       | 0-15°        |

### Diagnostic Assessment

A conservative management was given, patient was suggested to use knee brace for stability of the joint and was given analgesic for reducing pain and was referred to physiotherapy. The diagnosis was confirmed by MRI and radiological images. The special tests such as Lachman’s test, anterior drawer test and varus stress test were positive.

MRI impression reveals T2/ STIR hyperintensity in medial and lateral condyle of tibia s/o bony contusion. T2/PD fastest hyper intensity along the ACL involving more than 50% of fibers with fraying along its tibial attachment s/o partial tear. Minimal joint effusion along the periarticular surface. The isometric strength and ROM was assessed and was found to be reduced, which is gradually improving with the phases of physiotherapy.

### Therapeutic Intervention

Physiotherapy management was started early to avoid further loss of function in long run. The goal is to achieve maximum functional level without opting for any invasive procedure.

#### Phase 1: Day 1-7 (Immediate rehabilitation)

Goals: To reduce pain and swelling around joint, Increase range of motion of flexion extension, Make patient independent.

Brace was given to patient in extension. Weight bearing was avoided and support of walking aids was given. Exercises were started like ankle pump (10 rep), complete knee extension is given passively by applying overpressure, on day 5th active assisted knee flexion upto 90°, straight leg raise exercise with 5 rep of flexion, abduction and adduction, isometric exercises of quadriceps and stretching of hamstring, Continuous Passive Motion- 0-45/50 degrees to increase ROM.

#### Phase 2: week 2-4 (Early rehabilitation)

Goals: Keep constant passive knee extension, slowly improve knee flexion range of motion, reduce bulging and discomfort, Increase Mobility for patella.

Week 2 management: Transitional hinged brace was used to allow the movements while protecting the joint. It was discontinued when the patient tolerates the condition at 2-3 wk. Walking aid was given to avoid weight bearing.
Full ROM was maintained passively and 4-5 times stretching exercises were done regularly [4]. Static quadriceps training for up to 10 rep, straight leg raise exercises for 5 rep, extension of 90-40 degrees, hamstring curls, patellar mobilization were started. To reduce swelling, cryotherapy was given for 20 minutes and elevation of limb above heart level was suggested.

Week 3: Range of Motion (ROM) were progressed to resume arc of motion and elongation of muscles. The previous training program of 2nd week was progressed, with the goal of increasing passive ROM up to 0-115 degrees, static bicycling for range of motion and endurance program for eccentric quadriceps 40-1000, resistance exercise were started for progression (begin with 1 kg and addition of half kg each week). Walking aids were removed and full weight bearing was started. Weight shifts were performed to progress proprioception drills and neuromuscular regime.

**Phase 3: 4th – 10th week (Ambulation period)**

**Week 4:**
Exercises: Improve static strengthening program, extension of knee 90-400 (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. 30-degree wall squats for 10 reps were continued with by standing on one leg with help of support, Lateral lunges (10 reps), front steps ups (10 reps) for proprioception and balance training.

Weeks 6:
All above exercises were continued. Side lunges (5 reps), side and front steps ups (5 reps), and with agility drill and balance on tilt boards.

**Week 8:**
All above exercises will continue with basic polymeric.
Isokinetic exercise to increase the range of motion from 120 to 140 degrees. Bicycling for endurance training.

**Week 10:**
All above exercises will continue with basic polymeric. Isokinetic exercise to increase the ROM up to 120-1400. Bicycling for endurance training along with stretching [5].

**Phase 4: 10th to 16th week (Advance activity)**

Goals: 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 running specific training week 16th-22nd**

Goals: 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 [6]. Carry-out lower extremity drills, to improve speed and sudden change in direction training, training should be sport-specific.

**DISCUSSION**

According to current research, most significant result is that young active patients with partial ACL tears are treated non-operatively [7]. Nonoperative care has its own set of indications and outcomes, but the traditional patient demographic has shifted [8]. With improved longevity, patient standards for long-term sports participation have risen exponentially [9]. Furthermore, patients are becoming more conscious of how much time they may spend out of work or away from their sport, as well as how these time periods may vary between nonoperative and operative treatments. In the studies according to some case reports it is seen that a patient of partial ACL tear may after a time lap progress into complete ACL tear even after physiotherapy management so, the case presented by us is find to reconstruct the torn fibers of the ligament without any arthroplasty. Arthroplasty is the current method given by studies in which if there is partial ACL tear the surgeon does the sutureting of the ligament. When a surgical procedure is chosen, the ACL is reconstructed using tissues from another part of the body. This process takes time and is yet to show a good result therefore, the patient treated by conservative management is slower in progression but shows the good result [10].
CONCLUSION
Patient showed a great co-operation during the therapeutic period and now the patient is able to maintain his consistency in his running practice. The outcome measures of physical therapy intervention progressed him in an enhanced athlete with return to his sport.

Author’s Contribution
All authors contributed equally to the manuscript.

Conflict of Interest
The authors declare no conflict of interest.

Acknowledgement
We thank the patient who participated and contributed to the study.

Informed Consent
Written informed consent was obtained from patient in the study.

REFERENCES
1. Colombet P, Dejour D, Panisset J-C, Siebold R, 2010. “Current concept of partial anterior cruciate ligament ruptures”. Orthop Traumatol Surg Res. 96(8), S109–18.
2. Koch M, Mayr F, Achenbach L., Krutsch W, Lang S, Hilber F, et al., 2018. “Partial Anterior Cruciate Ligament Ruptures: Advantages by Intraligament Autologous Conditioned Plasma Injection and Healing Response Technique—Midterm Outcome Evaluation”. BioMed Res Int. 2018, 1–9.
3. Sonnery-Cottet B, Colombet P, 2016. “Partial tears of the anterior cruciate ligament”. Orthop Traumatol Surg Res. 102(1), S59–67.
4. Shadmehr A, Hadian MR, Naiemi SS, Jalaie S, 2009. “Hamstring flexibility in young women following passive stretch and muscle energy technique”. J Back Musculoskelet Rehabil. 22(3), 143–8.
5. Bele A, Qureshi M, Dhankar S, Seth N, 2020. “Impact of fall on anterior cruciate ligament of 33-year-old male”. J Datta Meghe Inst Med Sci Univ. 15(1), 132–132.
6. Baumann E, Rice W, Selhorst M, 2018. “Rehabilitation considerations for an uncommon injury of the knee: a case report”. Int J Sports Phys Ther. 13(3), 511–9.
7. Paterno MV, 2017. “Non-operative Care of the Patient with an ACL-Deficient Knee”. Curr Rev Musculo Skelet Med. 10 (3), 322–7.
8. Prasad Risaldar, Akshata Raut, Dushyant Bawiskar, Waqar M. Naqvi, 2020. “Impact of Physiotherapy rehabilitation program on postoperative ACL tear patient on prognosis leading to maintain consistency in sport”. Int J Res Pharm Sci. 11(3), 4821–5.
9. Darware M, Naqvi WM, 2020. “A case report on Physiotherapy rehabilitation accelerating the recovery of older patient with anterior cruciate ligament reconstruction”. Medical Sciences. 6.
10. Greenberg EM, Greenberg ET, Albajough J, Storey E, Ganley TJ, 2019. “Anterior Cruciate Ligament Reconstruction Rehabilitation Clinical Practice Patterns: A Survey of the PRiSM Society”. Orthop J Sports Med. 7(4), 2325967119839041.

How to cite this article
Gayatri K, Ragini D, Sakshi P. A, Waqar M. N, 2021. “Conservative Rehabilitation of Partial Anterior Cruciate Ligament Tear For Better Functional Outcome”. Jour. of Med. P'ceutical & Allied. Sci. V 10 - I 5, 1329 P-3606-3609. doi: 10.22270/jmpas.V10I5.1329.