MEDICAL SCIENCE

A tailor-made rehabilitation for patients with talofibular and talocalcaneal ligament tear: A case report

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ABSTRACT

Ailments to the ankle contribute to 10% to 30% of all sports-related sprains and players who experience ankle ailments place a financial strain on Medicare systems each year irrespective of the individual characteristics, the overwhelming of ankle injuries cause damage to the ankle's lateral ligaments. The preponderance of ankle ailments impacts the lateral ligaments. Athletes who have lateral ligament ailments may see a considerable decline in their performing skills, which might lead to complement losses and financial losses for both the player and the club. Ankle sprains with acute inversion rank amongst the most frequent musculoskeletal ailments. Since most recorded incidents are often categorized as lateral ligament injuries, isolated CFL ailments are uncommon. High-grade sprained ankles like those to the anterior talofibular ligament (ATFL) and calcaneofibular ligament (CFL) can be particularly challenging to cure. There are both internal and external possible causes for the emergence of persistent destabilization. Damage processes that occur in sporting and/or professional situations are associated with external components, which also arrange specific information, primarily anatomical, with its fluctuations (bone, ligament and posture). A 48-year-old male patient was referred to the physiotherapy department with chief complaints of pain and swelling over the right ankle joint. The physiotherapy session for the patient was started with appropriate physiotherapy protocol using thera-band and wobble board training for strengthening and proper weight-bearing training. The home program was given to patients' i.e use of cryotherapy for inflammation if seen again due to overexertion, use of sandbag for strengthening of the lower limb.

Keywords: Ankle ligament tear, talofibular ligament, talocalcaneal ligament, physiotherapy, rehabilitation.

1. INTRODUCTION

One of the foremost prevalent musculoskeletal injuries is lateral ankle sprain (LAS), which affects a significant portion of the normal community, especially

those who engage in sports and other leisure fitness exercises (Li et al., 2020; Kharche et al., 2021). 7–10% of all admittance to hospital emergency rooms is due to ankle sprains. Roughly 25% of all musculoskeletal system ailments are caused by inversion injuries and about 50% of these injuries are caused by sports (Van et al., 2013). Ailments to the ankle more typically involve the lateral ligaments (Panagiotakis et al., 2017). Chronic instability and prolonged discomfort are present in more than 20% of ankle sprain patients. A mechanical ankle instability (MAI) resulting from ligament degeneration might occur in certain individuals with chronic ankle instability (CAI) (Li et al., 2021). CAI is defined by a predisposition for repetitive ankle sprains, frequent incidents or impressions of the ankle succumbing and enduring indications such as pain, edema, restricted mobility, weakness and decreased self-reported performance (Hertel and Corbett, 2019). MRI is indeed very effective in the examination of anterior talofibular ligament tear and has great treatment value in the first diagnosis of anterior talofibular ligament (ATFL) impairment (An and Yan, 2021). The lateral ligament complex is made up of the three capsular ligaments called the calcaneofibular (CFL), anterior tibiofibular and posterior talofibular ligaments (PTFL). The plantar flexion and inversion injuries most usually result in ATFL tears. In addition, injuries can occur to the CFL, PTFL and after a severe inversion, the subtalar joint ligaments (Lynch and Renström, 1999). The inferior section of the anterior border of the distal fibula is where the ATFL and CFL originate. They do not continue to the distal fibula's tip, which is left free. The inferior band of the ATFL was where the CFL's beginnings were located (Matsui et al., 2017). The biomechanical function of the talocrural joint is to distribute vertical stresses to a downward structure or plantar weight-bearing and to transmit body weight to the complete foot (Bonnel et al., 2010).

Pathophysiology of CFL

The posterior lateral tubercle of the calcaneus receives the CFL, which starts first via the anterior lateral malleolus. Its width ranges from 6 to 8 mm and its length are around 20 mm. The fibularis brevis and longus tendons, as well as their outermost part, travel through the CFL ligament. In 35% and 42% of instances, correspondingly, the lateral or anterior talocalcaneal ligaments reinforce the CFL. Among both plantarflexion and dorsiflexion, the CFL prevents inverted and stabilizes the subtalar joint. While inverting in excessive dorsiflexion causes a solitary CFL injury, simultaneous inversion and supination cause damage to the lateral ankle (Le and Tiu, 2022).

2. PATIENTS' INFORMATION

A 48-year-old male patient was referred to the physiotherapy department with chief complaints of pain and swelling over the right ankle joint. My patient was apparently alright 9 months back, he was training for police admission exams and while training he twisted his right ankle medially in long jump sports practice, after which he was unable to bear weight on his right ankle. The patient noticed swelling after the incident so he went to the orthopedic doctor who suggested him X-ray and MRI (Figure 1, 2) of the ankle which revealed a talofibular ligament tear and talocalcaneal ligament tear after the investigation was done the patient was advised surgery by the doctor but the patient was not ready to do it so he underwent conservative management due to which he stopped his training for the police admission. For that first, he took Ayurveda (naturopathy) treatment for the same reason for 4 months but he did not feel any relief so he stopped the treatment and came to AVBRH one month back. He was then referred to physiotherapy for further management. No history of the presence of any co-morbidities & previous surgery. Family history was not significant in the present condition. The patient has a mixed diet with normal bowel & bladder habits and a disturbed sleep cycle due to pain. No history of any deleterious habits.

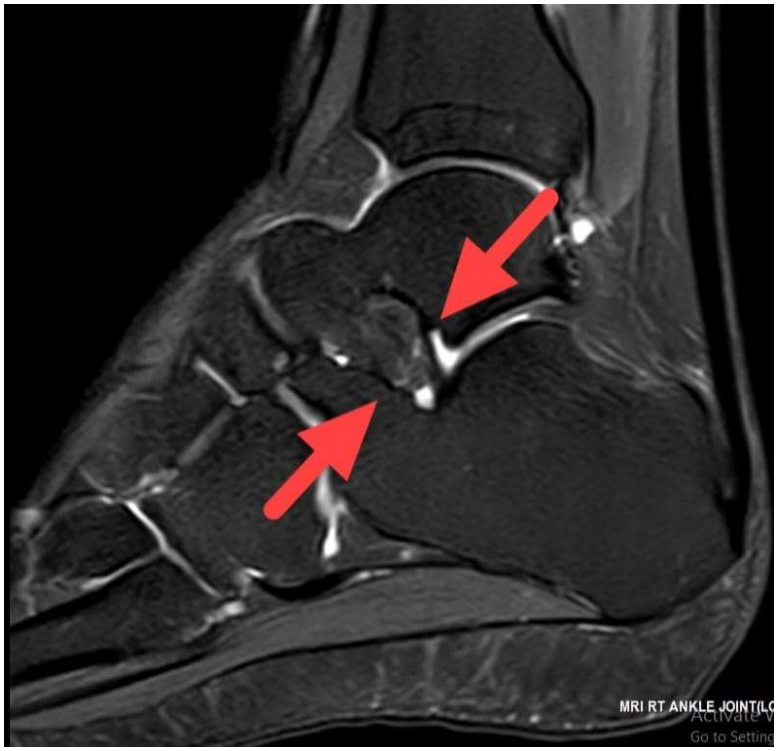

Figure 1 MRI showing talofibular ligament tear

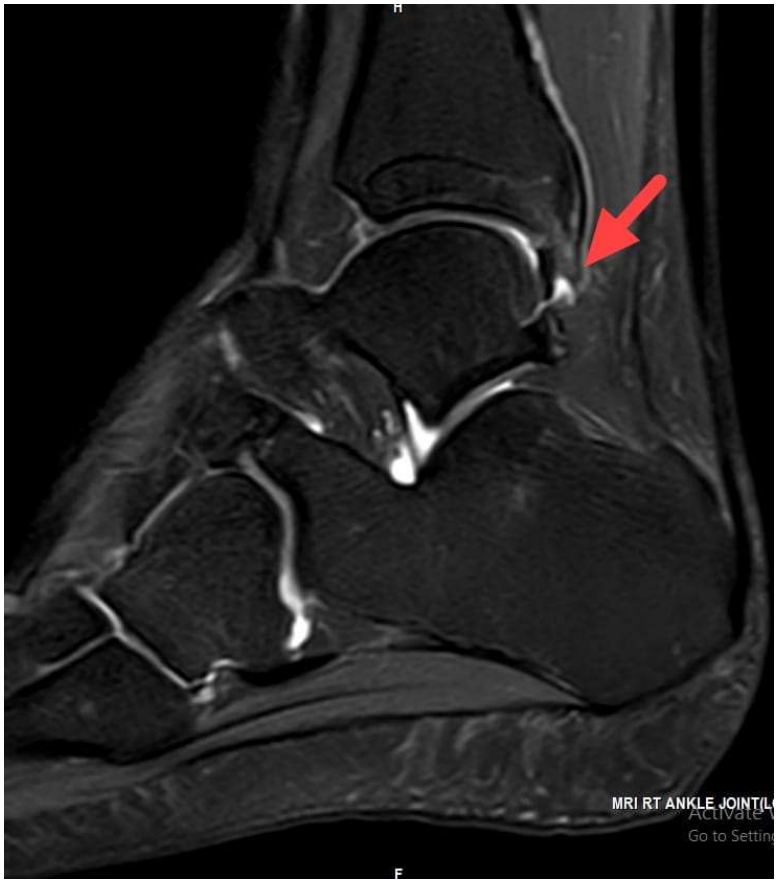

Figure 2 Hyper intensity in posterior talofibular ligament tears which indicates joint effusion

MRI revealed hyper intense signal in posterior talofibular ligament with fluid surrounding it, suggestive of partial thickness tear. However, its attachments and contiguity are normal and is maintained.

3. CLINICAL FINDINGS

At first, assessed immediately following the incident, the right ankle was sore, swollen and warm and after performing an anterior drawer test for the ankle he had increased laxity. Self-completed verbal analog scale (VAS) score for pain was 2/10 before intervention and after intervention score was 9/10. The pain was sudden in onset and progressive in nature. It was aggravating with movement and relived at rest and medication. The affected ankle's 56.5 cm ankle joint edema was measured using the Figure-of-Eight technique. The patient showed a decreased capacity for weight bearing.

According to the observations, the body type was ectomorph and was conscious, well- oriented with time place and person. The range of motion (ROM) was measured by a goniometer (Table 1). Table 2 shows the results of the manual muscle testing (MMT). Table 3 showing outcome measure pre- and post-intervention.

Table 1 ROM pre and post rehabilitation (right side)

Movement	Pre-rehab ROM (in degrees)	Post-rehab ROM (in degrees)
Ankle plantarflexion	0-15	0-40
Ankle dorsiflexion	Not assessable	0-20

Table 2 Manual muscle testing of pre- and post-rehabilitation

Muscles	Pre-intervention	Post-intervention
Ankle flexor	2/5	5/5
Ankle extensor	2/5	5/5

Table 3 Outcome measures of pre and post intervention

Scales	Pre-intervention	Post-intervention
Foot and ankle ability measure scoring	40/90	10/90
Karlsson scores	50/100	5/100
Cumberland Ankle Instability Tool (CAIT)	7/30	27/30

Therapeutic intervention

Gait retraining and range-of-motion activities are the first steps in physical therapy. Training for balance and strengthening are started after two weeks (Table 4).

Table 4 Therapeutic intervention

Week	Goals	Therapeutic Interventions	Dosage
1st week	Reduce pain and inflammation To reduce swelling Convalesce range of motion Convalesce muscle strength Restore functional independence	Ankle pumps: Active ankle pump exercise for the both the legs Cryotherapy Isometrics exercises: Quadriceps femoris, hamstrings, and glutei Straight leg raises Dynamic strengthening exercises bilateral lower limb	Starting with 10 repetitions in a set of 1 twice a day with 5 sec hold, continued further with 10 repetitions 3 to 4 times per day with 10 sec hold
2nd week	Alleviate pain Improve ROM Improve functional Independence	Cryotherapy Weight bearing exercises for right lower limb Dynamic strengthening exercises bilateral lower limb Isometric exercises: Tibialis anterior, vastus medialis, soleus, sartorius, plantaris, biceps femoris	Starting with 10 repetitions in a set of 1 twice a day with 5 sec hold, continued further with 10 repetitions 3 to 4 times per day with 10 sec hold
3rd week	Enhance ROM Enhance muscle strength.	Femoris, hamstrings, vastus medialis oblique and glutei dynamic	Initially 15 counts of 1 set gradually

	Ameliorate functional independence	strengthening exercises Proprioceptive training Strengthening exercises: Tibialis anterior, soleus, sartorius, plantaris, biceps femoris	increase with 15 counts with 10 sec hold
4th week	Improve ROM. Improve muscle strength. Enhance functional independence	Femoris, hamstrings, vastus medialis oblique and glutei dynamic strengthening exercises Strengthening exercises: tibialis anterior, soleus, sartorius, plantaris, biceps femoris Squatting exercises (Figure 3) Toe off exercises (Figure 4) Heel off exercises (Figure 5) Lunges Balance training (Figure 6) Wobble board exercises (Figure 7) Thera-band exercises for dorsiflexors and plantar flexors (Figure 8)	Initially 20 counts of 1 set gradually increase with 20 counts with 10 sec hold

Home protocol

It was advised that the patient keep up his physical treatment. The patient significantly reduced pain and improved ankle joint mobility following physiotherapy treatment, cryotherapy for 10 min to reduce inflammation. We advised the patient to tie sand bag and strengthen lower limb.

Follow-up and outcome

The patient experienced no pain in his ankle joint and was capable of carrying out the majority of everyday tasks. The ROM of the ankle joint also increases. The patient was very enthusiastic and willing to engage in physiotherapy. The patient was also instructed to correct his or her posture and shared information on at-home exercise plans. Increased ankle ranges in the patient resulted in improvements. Improvements are shown progressively as the patient continues through physiotherapy treatments.

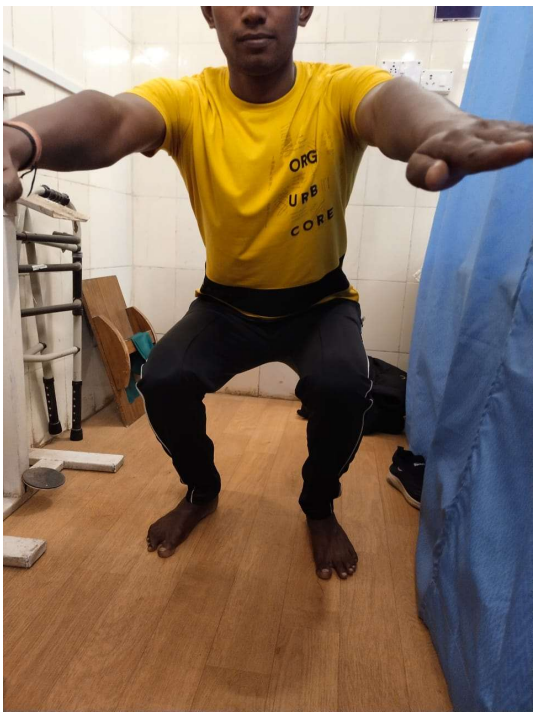

Figure 3 Squatting exercise

Figure 4 Toe off

Figure 5 Heel off

Figure 6 Balance training

Figure 7 Wobble board training

Figure 8 Thera-band exercises

4. DISCUSSION

Tran and Mc-Cormack, (2020) stated that exercise therapy should be used in conjunction with functional support (such as an ankle brace) or manual mobilization to cure lateral ankle sprains at an early stage. The recommendations do not recommend using RICE alone to cure a lateral ankle sprain. Acupuncture, vibration treatment, laser treatments or bioptron light therapy is not suggested treatments for an early lateral sprained ankle (Tran and Mc-Cormack, 2020). In our study, we managed the patient with strengthening exercises that help him strengthen his weakened muscle and do work efficiently. Doherty et al., (2017) stated that exercise treatment and bracing are well supported by the strongest information synthesis of high-quality reviews in avoiding the recurring of an ankle sprain. It is controversial whether acupressure and surgeries are effective treatments for acute ankle sprains. There is not enough research to justify the usage of ultrasonography in the management of chronic ankle sprains (Doherty et al., 2017). In our case, we treated patients with constructive physiotherapy protocol which help a patient in the rehabilitation of an ankle ligament tear in a conservative manner without undergoing surgery. Lazarou et al., (2018) demonstrates that in addition to both balance and PNF programs, individuals with ankle sprains showed substantially significant improvements in dorsiflexion range of motion (ROM) and the majority of adaptive ability assessments eight weeks following treatment. The frontal plane equilibrium assessment and discomfort both showed statistically substantial changes as a consequence of the equilibrium exercise eight weeks following treatment. The PNF regimen failed to ease pain or enhance equilibrium eight weeks just later the commencement of training (Lazarou et al., 2018). In our case, we train ankle plantar and dorsiflexors with proper stretching and strengthening. Gogate et al., (2021) stated patients suffering from acute and subacute grade I and II ankle sprains who underwent two weeks of mobilization with movement (MWM) directed at the inferior tibiofibular joint demonstrated better and more sustained improvements in ankle pain, functional dorsiflexion ROM, impairment, pressure pain tolerance and balance than those who underwent sham MWM and conventional therapy. In our case, we gave proprioception training exercises to train proprioception which were initiated after 15 days and continue for 15 days on every alternate day. Hunt et al., (2019) stated the CFL is thought to be crucial to the steadiness of the ankle and subtalar joints as well as to the mechanics of tibiotalar connection, according to the findings of this biomechanical investigation conducted under simulated weight-bearing situations.

5. CONCLUSION

Our study has shown to have a positive rehabilitative outcome for patients with ankle ligament tears. This rehabilitative protocol has improved the dependency and strength of the patient. Also, proper patient education and counselling regarding further planning can encourage the patient to live a normal life. Cryotherapy helps in reducing inflammation. Stretching exercises focus on targeted muscle tightness or loosening the adhesion as well as elongation. Strengthening exercises for ankle joints help to regain strength in ankle plantar flexors and dorsiflexors muscles which help in proper weight-bearing on foot for ambulation. With proper guidance from the physiotherapist about the home protocol the patient to increase strength. These protocols if implied to the patient can give a long-term effect on improving the quality of life and will minimize the dependency of the patient on caregivers for doing the activities of daily living.

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Author contribution

Details of contribution of each authors regards manuscript work and production.

Author contribution

Samruddhi Karanjkar: Principal Investigator
Dr Pratik phansopkar and Dr Nikita Deshmukh: Supervisor

Informed consent

Written and Oral informed consent was obtained from all individual participants include in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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