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Integrated manual therapy program along with exercise training for the rehabilitation of lateral ankle sprain: A case report

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Abstract

Lateral ankle sprain is most common injury occurred during sports after forceful inversion. A comprehensive rehabilitation protocol is needed for faster recovery and avoiding recurrence. A case of 23-year-old male, amateur football player, had an injury to his left ankle. He developed sudden onset of pain, swelling and was not able to bear weight on his left ankle. Orthopaedic doctor suggested him 6 weeks of immobilization in plaster cast after confirmation of anterior talo-fibular ligament grade III and Posterior talo-fibular ligament and Deltoid ligament grade I sprain on MRI. After cast removal, he was referred to physiotherapy. The patient presented with pain, swelling, decrease muscle strength, kinesiophobia and incomplete ROM of the left ankle joint. A customized physiotherapy protocol was followed for 12 weeks after immobilization period. Phase wise integrated manual therapy program along with exercise training showed significant improvement in ankle joint function after lateral ankle sprain.

Keywords: Exercise, lateral ankle sprain, manual therapy, PNE, proprioception

1. Introduction

Ankle sprain is the most common injury occurred during sports participation. Lateral ankle sprain constitutes more than three-quarters of all acute ankle sprains. Approximately 73% of these are injuries to the anterior talofibular ligament^[1, 2]. Sprains of the lateral ligaments of the ankle are the most common traumatic injury sustained during sports participation due to forceful inversion of plantarflexed foot^[3]. Acute overstretching or tearing of the ligaments and fibrous capsule of the ankle joint causes functional limitations in ambulation, joint mobility, proprioception, balance etc. Supervised rehabilitation is warranted for complete and speedy recovery following lateral ankle sprain^[4]. Therefore, this study intended to design a rehab protocol including integrated manual therapy and the proprioceptive exercises along with other traditional exercises following lateral ankle sprain.

2. Case presentation

A 23-year-old male amateur football player. While playing football his left ankle of grounded foot twisted inwardly and lost his whole balance. He heard a pop sound at the inverted foot. He developed sudden onset of pain, swelling and was not able to bear weight on the left ankle joint. He consulted Orthopaedic, that suggested him for 6 weeks of immobilization in plaster cast after confirmation of Anterior talo-fibular ligament (ATFL) grade III and Posterior talo-fibular ligament (PTFL) and Deltoid ligament grade I sprain on MRI. During immobilization, he was advised for partial-weight bearing walking with the help of elbow crutch.

After removal of the cast (6 weeks of period) he was referred to the outpatient physical therapy department having complaints of pain, swelling, incomplete ROM and difficulty in walking with full weight bearing on left ankle joint. The patient was assessed accordingly. Customized physiotherapy protocol including the integrated manual therapy program along with the exercise training was designed to achieve the goals. On first visit, pain neuroscience education was given. The physiology of pain and the biopsychosocial model of pain was explained. Pain physiology education with movement approaches helps to increase physical capacity, reduce pain and improve quality of life. It helped the patient perception and to cope with the fear of weight bearing on the left ankle joint. As he was amateur football player and educated about the condition, helped for the good prognosis.

2.1. Case examination

After 6 weeks immobilization, he reported pain intensity of 7/10 (NPRS) on exacerbation of symptoms and 3/10 (NPRS) on non-exacerbated state. His exacerbation of pain was during weight bearing and during the ankle dorsiflexion, plantarflexion and inversion movements of left ankle joint and full pain relief with no movement. The patient severity level was 5 which is pain with activities of daily living (ADLs). On inspection there was mild swelling and ecchymosis present on the lateral aspect of the left ankle. On palpation, grade 2 tenderness over lateral joint line, a 2.5 cm increase in girth at ankle due to localized swelling with no rise in local temperature. On initial examination, active range of motion of the ankle joint was measured with the standard goniometer. There was limitation in the all the active ROM of left ankle joint, mostly dorsiflexion and inversion ROM. The passive

range of motion was complete and painful for all ranges at left ankle joint. After initial first few days, as swelling subsided, the strength was evaluated by Manual Muscle Testing (MMT) using the MRC gradings. The strength of the left ankle joint muscles was 3/5 (MRC Gradings). The accessory movement of the left ankle joint it was grade 2 that is hypomobile for the long-axis extension, talocrural joint, talar rock and side tilt. The functional outcome measures for assessing the balance, proprioception, fear and the function were evaluated at baseline and at 12 weeks using Foot Ankle Disability Index (FADI).

TAMPA scale of kinesiophobia (TSK) was administered at baseline and at the end of 12 weeks post-intervention.

2.2. Table

Table 1: Clinical examination pre-treatment and post-treatment

Physical examination		Initial evaluation			Post 12 weeks	
Pain		8/10			2/10	
Swelling girth		142.7 cm			140.1 cm	
ROM	Active	Passive	END feel	active	Passive	End feel
Left ankle ROM						
Dorsiflexion	0-8	not	empty	0-18	0-20	tissue stretch
Plantarflexion assessable	0-38		empty	0-48	0-50	tissue stretch
Inversion	0-33		empty	0-46	0-50	tissue stretch
Eversion	0-27		empty	0-45	0-50	tissue stretch
MMT						
Dorsiflexors	not			Grade 4		
Plantar flexors	assessable due to swelling and pain			Grade 4+		
Invertor's				Grade 4		
Evertors				Grade 4		
FADI	71%			92%		
TAMPA	49			20		

FADI: Foot ankle disability index, TAMPA: Tampa scale of kinesiophobia (TSK), ROM: Range of motion, MMT: Manual muscle testing

3. Intervention

Customized rehab protocol of supervised therapy for 12 weeks was followed. Inform consent was taken from the patient before starting the physiotherapy treatment. Initially for the first 2 weeks patient visited for 6 sessions a week.

3.1. Description of physiotherapy intervention

Physical therapy intervention started after 6 weeks of immobilization.

Phase wise supervised intervention-

Week 1-2-(early post-immobilization phase)

Ankle brace was advised for 2 weeks for improving the stability at the ankle joint ^[7]

From the first day of physical therapy treatment, cryotherapy with cold packs for 20 minutes was given ^[5].

Ultrasound with phonophoresis to the lateral aspect of the ankle below the lateral malleoli was given for 7 min with the intensity of 0.8 mW/cm².

Ankle mobility exercises *i.e.*, active ROM exercises within pain-free ROM for all movements, 10 reps each were performed.

As per the evaluation of joint mobility, Maitland mobilization of grade II and III were given to talocrural joint, subtalar joint and the tarsal joints. Antero-posterior glide at talocrural joint to increase dorsiflexion, calcaneum eversion and inversion was performed. Subtalar and mid tarsal antero-posterior glide Grade II and III for 2 sets of 60 seconds with the 1-minute rest in between sets and 3 sets of 60 seconds with 1 minute rest in between sets respectively ^[6].

Passive stretching to the gastrocnemius and soleus muscle was given for 3 reps of 2 sets 30sec hold each.

Weight bearing as tolerated was advised after immobilization. Later in the first week, strengthening exercises were started in the form of isometric exercises to the ankle joint for dorsiflexors, plantar flexors, evertors and invertors with the manual resistance of 10 sec hold x 10 reps.

Self-stretching of the gastrocnemius and soleus was introduced in the 2nd week with the help of the towel in a long sitting position for 5 reps 30 sec hold of each for 2 sets, two times a day for bilateral lower limbs.

During this phase, active range of motion exercises, cryotherapy, self-stretching of gastro-soleus muscle were given as home exercise program twice a day.

A Week 3-5 - (intermediate phase)

Mulligan's Mobilization with movement in non-weight bearing position was started to increase the dorsiflexion ROM. The patient was in supine position with the foot out of the couch. Therapist was standing facing the ankle with the hand at the distal tibia-fibular joint and the other hand giving the antero-posterior glide to the talus with the web space of the hand. Along with the glide patient performed the active dorsiflexion movement. 4 glides/ repetitions with 10 sec hold each for 4 sets.

Self-stretching of the gastrocnemius and soleus was introduced in the 3rd week with the help of the wall in a lunge position parallel to the wall and the feet pointed forward keeping the back leg knee extension to feel stretch for 30 sec. stretch 5 times for 30sec hold two times a day for bilateral

lower limbs.

Strengthening exercises were progressed from isometrics to resistance training using wide elastic band of known resistance ideal 3 sets of 12 to 15 reps per set. The resistive exercises were beginning with the less-firm elastic band, fewer sets/reps and the resistance and the sets were increased based on the patient's ability.

Peroneal muscles strengthening was focused.

Weight bearing exercises like single leg standing with support and heel raises with support on a parallel bar for 10 sec hold x 10 reps.

Stretching to the gastrocnemius and soleus muscle was added with home-exercise program.

By this time, patient achieved pain-free weight bearing, which may indeed be at the onset of rehabilitation, proprioception training was initiated for the recovery of balance and control. Proprioception training started with balance trainer instrument that is wobble board an inflated half-circle ball used as platform to perform the exercise for 10 minutes. This was done Infront of the mirror. The support was provided with the help of bar. First started with double limb support and then the difficulty was increased with one leg stance, heel raises, bilateral squats, unilateral squats. Duration was of 7 days /week for 5 weeks^[8].

The progression in the difficulty was added once the patient learned to balance on the wobble board.

Lunges anterior and lateral were started for 10 reps for bilateral lower limbs with the hands resting on the pelvis.

In this phase self-stretching in the lunge position and resistance exercises, proprioception exercises by single leg standing on the pillow was advised to do as home exercise program twice a day.

Week 6-8 – (Progression phase)

Mobilization with movement in weight bearing position by the help of the mulligan belt was performed. The patient was standing in the lunge position on the couch with the therapist applied the mulligan belt to the waist and to the left ankle joint of the patient. The therapist moves backward with the waist that gives posterior-anterior glide to the inferior tibia-

fibular joint that will lead to talus repositioning. The therapist placed his hand over the ankle to push the talus in to the position. During the glide the patient performed the dorsiflexion movement in lunge position. 4 glides 10 sec hold for 4 sets. Proprioception exercises were progressed with difficulty accordingly.

Week 9-12- (Advanced phase)

Plyometrics and agility exercises were initiated and continued. All the exercises were continued and progressed for maintenance of recovery.

3.2. Outcome measures

The table no. 1, shows the outcome measures initial evaluation values and the post 12 weeks improvement seen in each outcome measure.

The primary outcome measure was Foot Ankle Disability Index (FADI) which showed greater improvement in the functional disability from the initial evaluation that was 71% and after 12 weeks of intervention protocol there was 92%. The FADI interprets as lesser the percentage, greater the disability present. However, in this patient there was change in the percentage with the difference of 21% from the initial evaluation.

Outcomes like pain, ROM, swelling and muscle strength all showed good improvement from the initial values. The patient had pain 8/10 decreased to 2/10. The patient regained range of motion for all ankle range of motion, dorsiflexion was the most common range of motion limitation in ankle sprain that showed good improvement from 8 degree (initial value) to 18 degree (post-12 weeks) active ROM. Muscle strength of the ankle joint muscles dorsiflexors, plantar flexors, invertors and evertors showed improvement after MMT to grade 4/4+ the patient was now able to bear weight on the left ankle joint and was able to balance without pain.

For kinesiophobia, a self-reporting TAMPA scale of kinesiophobia (TSK) was used. Which is reliable and valid. Initially the score was 49 after 12 weeks of intervention it reduced to 20 reflecting.



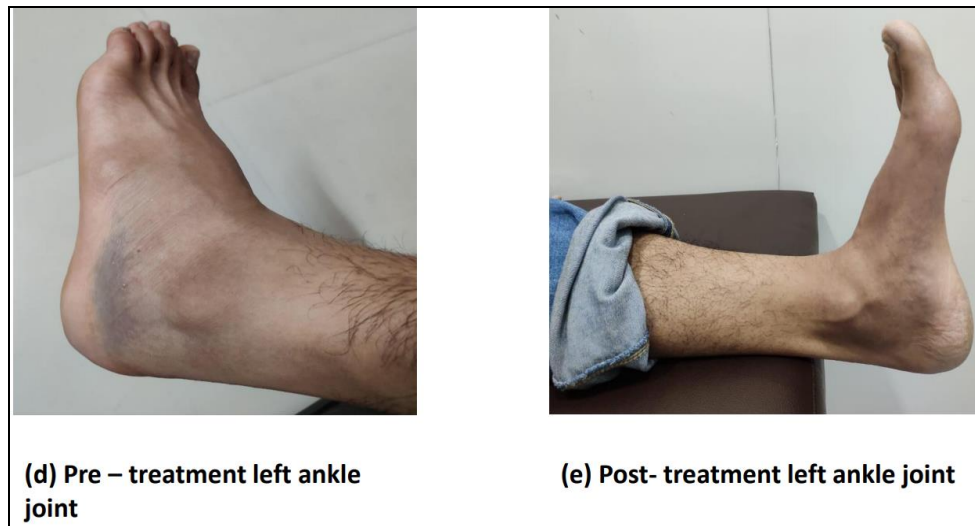


Fig 1: Shows the intervention given and the pre-post effect over the left ankle joint.

4. Discussion

Patient had lateral ankle sprain associated with Anterior talo-fibular ligament (ATFL) grade III and Posterior talo-fibular ligament (PTFL) and Deltoid ligament grade I sprain. The problems were reflected in the outcomes used pre-treatment and post-treatment. For pain, the patient showed good improvement on numerical pain rating scale (NPRS) from 8/10 pre-treatment it reduced to 2/10 after 12 weeks of treatment. For the disability in activities of daily living the outcome measure FADI was evaluated pre-treatment and post-treatment which showed greater improvement from 71% to 92% respectively. The integrated approach of manual therapy and the exercise training showed great improvement in the mobility and the stability of the left ankle joint. Kinesiophobia was substantially declined after injury and improved incrementally after treatment. As in the first session (PNE) Pain Neuroscience Education was delivered to the patient which significantly helped for better prognosis. Psychological traits also play an important role in pain reduction and recovery of the injury. The integrated manual therapy approach that was customized and specific for the patient symptoms showed greater improvement in all the outcome measures used. The phase wise goal-oriented intervention resulted in good prognosis and may avoid recurrence in future.

5. Conclusion

Phase wise integrated manual therapy program along with customized exercise training for 12 weeks after immobilization showed significant functional improvement in ankle joint mobility as well as stability after lateral ankle sprain.

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