

Functional Outcome of Cast Immobilisation and Functional Treatment in Management of Lateral Ankle Sprain (Grade 1 and 2)

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Abstract:- Background: Pain and functional constraints from ankle sprains, which mostly impact the lateral ligamentous complex, can lead to the consumption of medical facilities and unavailability from workplace. No single technique is regarded as the most effective, despite the fact that this injury occurs frequently. This study evaluates the management modalities for lateral ankle sprain i.e. functional treatment and cast immobilization with pain and function as outcome variables.

- **Materials and methods:** Seventy patients with lateral ankle sprains (grade 1 and 2) were included in this study. Each alternate participant was placed in a functional treatment (group A), while the other participants were placed in a cast immobilization group (group B). Every patient was assessed at a follow up of 2 and 6 weeks using Visual analog scale and Karlsson score for quantifying pain and function respectively.
- **Results:** Thirty-two patients in the functional therapy group and twenty-eight in the cast immobilization group finished the study. The functional therapy group's mean age was 27.7 years, while the cast immobilization group's was 29.4 years. While both the right and left ankles were similarly impacted in the cast immobilization group, the dominant ankle involved in the functional treatment group was the right ankle in 19 patients and the left ankle in 16 patients. In both groups, a male preponderance was seen. By the end of the study, the mean differences between the two groups' Karlsson scores and visual analog scale scores were statistically significant.
- **Conclusion:** Our study's findings show that a functional treatment outperforms immobilization in terms of both functional outcome and pain reduction.

Keywords:- Lateral Malleolus, Functional Treatment.

I. INTRODUCTION

Seven to ten percent of all emergency visits are thought to be related to acute ankle sprains. An inversion of a plantar flexed foot is the secondary mechanism of this type of damage.^{1,2} Crichton developed a three-grade system for evaluating such injuries based on their severity.¹

- Grade I □□ stretched ligament, with stable joint and a negative drawer test.
- Grade II □□ partially torn ligament with a lax joint and partially positive anterior drawer test.
- Grade III □□ complete ligament rupture with an unstable joint and a positive anterior drawer test.

Despite the great prevalence of these injuries, there isn't a single, accepted therapy that is better than the ones that are available right now. Pain and other disabilities brought on by these injuries may lead to the usage of medical services and unavailability from work. Therefore, prompt detection and treatment of these injuries are beneficial.³ For the initial management, the RICE (rest, ice, compression, and elevation) treatment technique is still being used. Such injuries are also treated with surgery, plaster immobilization, elastic bandages, steroid injections, and non-steroid analgesic prescriptions.⁴ When treating acute injuries, the most crucial goals are to reduce the duration, stabilize the ankle joint, and avoid recurrence and repeat of similar injuries.

According to prior research, immobilization is not as effective as early mobilization with weight bearing and may or may not involve the use of external support in the form of tape, braces, or elastic bandages.⁵ However, no difference was found between the two groups of functional therapy versus immobilization in a meta-analysis research by done by Kerkhoffs et al in terms of functional outcomes.⁶ In a study done by Lamb et al., cast immobilization showed faster healing of the injured ankle. Their findings indicated that, for the first 3 months, cast immobilization was more effective but after nine months, both were equally efficient.⁷

Prolonged cast immobilization causes the soft tissues surrounding the joint to become shortened and tender, which increases impairment. Consequently, functional treatment has been adopted to decrease the rate of muscle wasting and to quickly return to the pre-injury level of activities. Using the Karlsson score for functional evaluation and the VAS scoring for evaluation of pain, this study compares functional treatment to cast immobilization for the treatment of lateral ankle sprains (Grades I and II).

II. MATERIALS AND METHODS

From January to September of 2023, this study was conducted in the Department of Orthopaedics at Father Mullers Medical College in Mangalore. Seventy patients who met the following inclusion criteria were included in the study:

- Lateral ankle sprain (Grade I and II)
- Age 18-45 years
- Presenting within 48 hours of trauma

To exclude out any fractures, lateral and antero-posterior ankle X-rays were obtained. The study excluded any patients with fractures and other comorbidities. Informed consent was obtained from all patients and following that they were then randomly assigned to either functional treatment (group A) or cast immobilization group (group B). Beginning on day four, the patients in the functional treatment group underwent early mobilization and range-of-motion exercises while wearing ankle braces. At two and six weeks, the patients were evaluated again. The visual analog scale (VAS) was used to measure pain, and Karlsson scores for functional assessment at the time of presentation as well as at two and six weeks. Only 60 patients finished their complete follow-up; 32 of these patients were in the functional treatment group (group A), and the remaining patients were in the cast immobilization group (group B).

All data collected was expressed as Mean \pm SD and p value <0.05 was considered significant.

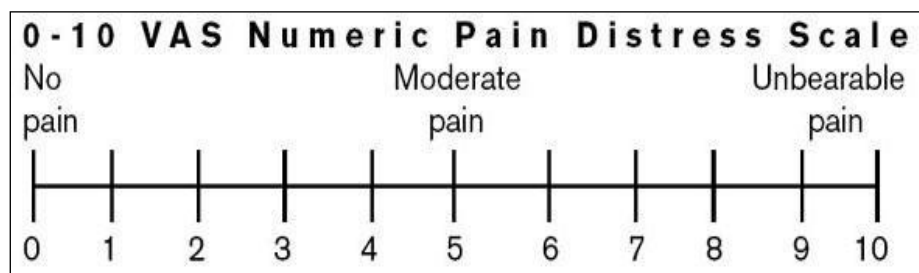


Fig 1: Visual Analog Scale

III. RESULTS

60 patients completed the study of which thirty-two were the functional therapy group and the remaining twenty-eight in the cast immobilization group. Patients in the functional therapy group had an average age of 27.7 ± 5.51 , while those in the cast immobilization group had an average age of 29.4 ± 7.50 . Bilateral ankles were equally impacted in the cast immobilization group, whereas the dominant ankle affected was the right ankle in functional treatment group (19 patients) and the left ankle was affected in 13 individuals.

Both groups showed a male preponderance (20 in the functional therapy group and 18 in the cast immobilization group), with the remaining patients being female.

Table 1: Pre-Treatment

Variable	Group A (Functional Treatment)	Group B (Cast Immobilization)
Age (Years)	27.7 ± 5.51	29.4 ± 7.50
Ankle		
Right	19	14
Left	13	14
Sex		
Male	20	18
Female	12	10

At presentation, the functional therapy group's mean visual analog scale score was 7.65 ± 1.18 , while the cast immobilization group's was 7.64 ± 1.06 . There was no statistically significant difference between the groups' scores ($p=0.96$). At two weeks, the functional therapy group's mean visual analog scale score was 5.31 ± 1.09 , while the cast immobilization group's was 5.92 ± 1.01 . There was a statistically significant difference between the groups' scores ($p=0.02$). At six weeks, the functional therapy group's mean visual analog scale score was 2.65 ± 1.09 , while the cast immobilization group's was 3.21 ± 0.62 . There was a statistically significant difference between the groups' scores ($p=0.01$).

Table 2: Visual Analog Scale Score

Variable	Group A	Group B	P value
At presentation	7.65 ± 1.18	7.64± 1.06	0.96
2 weeks	5.31±1.09	5.92±1.01	0.02
6 weeks	2.65± 1.09	3.21± 0.62	0.01

At presentation, the functional therapy group's Karlsson score was 22.84 ± 2.03 , while the cast immobilization group's was 22.37 ± 1.89 . There was no statistically significant difference between the groups' scores ($p=0.30$). At two weeks, the functional therapy group's Karlsson score was 54.87 ± 4.99 , while the cast immobilization group's was 52.51 ± 3.10 . There was a statistically significant difference between the groups' scores ($p=0.03$). At 6 weeks, the functional therapy group's Karlsson score was 76.06 ± 4.65 , while the cast immobilization group's was 73.20 ± 5.04 . There was a statistically significant difference between the groups' scores ($p=0.02$).

Table 3: Karlsson Score

Variable	Group A	Group B	P Value
At presentation	22.84± 2.03	22.37± 1.89	0.30
2 weeks	54.87±4.99	52.51± 3.10	0.03
6 weeks	76.06± 4.65	73.20± 5.04	0.02

IV. DISCUSSION

Our study's findings suggest that for lateral ankle sprains (grade I and II), functional treatment is superior than cast immobilization in terms of pain relief, improved range of motion, and increased functionality. One of the most common musculoskeletal ailments among athletes is an acute ankle injury.⁸ Ankle sprains that are left untreated can result in long-term issues, decreased range of movement, discomfort, and ankle joint instability that affect everyday living activities.⁹ Supporting, resting, applying an ice pack, and elevating the affected limb are the usual treatments for acute ankle sprains. Inflammation can be minimized by raising the affected limb.¹⁰

Ankle sprains can be treated with cast immobilisation, surgical repair, and functional therapies.^{11, 12} Cast immobilisation with a plaster cast below the knee is a two-edged sword: it can speed up the healing process, but it can also cause functional disability due to muscle atrophy. Ankle immobilization over time results in wasting of muscles and adverse effects on type I muscle fibers.¹⁰ Both the functional therapy and cast immobilization groups in our study had more male patients impacted. According to a study by Hosea et al.¹³, grade I injuries were more common in women, while grade II and III injuries did not differ statistically significantly between the sexes. In the functional treatment group of our study, the right ankle was more affected than the left, whereas in the cast immobilization group, both ankles were similarly afflicted. Numerous research have demonstrated that limb dominance does not appear in ankle injuries; however, one study did demonstrate that limb dominance is a significant factor in identifying the mechanism of damage.¹⁴ Compared to the cast

immobilization group, the functional treatment group's mean visual analog scale score was marginally higher, but it was lower in the second and sixth weeks. In the second and sixth week, the difference between the two groups was statistically significant, demonstrating that functional treatment is more effective than below-knee casts for reducing pain associated with lateral ankle sprains.

Elastic bandages were used in a prospective research to treat lateral ankle sprains, and after the third week of treatment, pain had significantly decreased.¹⁵ Although immobilisation can speed up healing for severe sprains, a meta-analysis revealed that functional treatment outperformed cast immobilization in terms of alleviating pain.¹⁶ In terms of ankle rehabilitation, a number of studies have demonstrated that active early therapy lowers the risk of re-injury by improving joint proprioception.^{17, 18, 19} When compared to the functional therapy group, the Karlsson scores in our study were significantly lower after week second than they were at the beginning of the study in the cast immobilization group. When comparing patients treated with functional treatment to those treated with cast immobilization, Eiff et al.¹⁵ discovered that the former returned to work significantly sooner. An earlier return to everyday activities results from early mobilization, which improves functionality.²⁰ Functional treatment helps patients preserve their mobility, which reinforces the ankle joint and reduces the risk of subsequent ankle sprains, according to numerous studies.^{21, 22, 23} One significant weakness of this study was its short observation time; we did not follow up with patients after six weeks following the injury, which would have allowed us to evaluate the treatment's long-term effects.

V. CONCLUSION

According to our research, functional treatment with early mobilisation and ankle brace reduces pain and improves functional outcomes in patients with lateral ankle sprains more than cast immobilization. Patients managed with functional treatment have an early return to the daily activities as compared to immobilisation.

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