International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

Comparison of Functional Treatment versus Immobilisation in the Treatment of Lateral Ankle Sprains (Grade I and II)

Dr. Mohieb Mustak Ahmed[1], Dr. Jubin Abraham Raju[2]

[1] PG Resident, Dept. of Orthopaedics, Father Muller Medical College

[2] Senior Resident, Dept. of Orthopaedics, Father Muller Medical College

Abstract: ***Background*: Ankle sprains, of which 85% approximately comprise lateral ligament complex involvement, can cause pain and other impairments, resulting in utilisation of healthcare resources and absteenism from work. Despite its common occurrence, no specific treatment is considered gold standard. This study assesses the treatment modality for lateral ankle sprain (grade I and II) in the form of functional treatment versus Plaster of Paris immobilisation, with pain and function employed as the outcome measures. *Materials and methods*: This study was carried out on 80 patients, diagnosed with acute lateral ankle sprains (grade I and II), of which every alternate subject was assigned to a functional rehabilitation program (group A) while the remaining subjects were assigned to have their ankle sprain immobilised in below knee cast (group B). All patients were subjected to the standardized treatment protocol of PRICE (protection, rest, ice pack application, compression and elevation). The patients were followed up at two and six weeks. Pain and functional assessment was done using the visual analog scale and Karlsson scoring. All data collected was expressed as Mean +/- SE and p value <0.05 was considered significant. *Results*: 65 patients completed the study with 33 in the functional treatment group and 31 in the cast immobilisation group. The mean age was 29.77 +/- 6.71 years in the functional treatment group, and 30.85 +/- 6.40 years in the cast immobilisation group. The dominant ankle involved was the right one in the functional treatment group in 18 patients and left ankle in 15 patients, while right and left ankles were equally affected in the cast immobilisation group. There was a male predominance noted in both the groups. Mean differences in visual analog scale scores and Karlsson score between the 2 groups were statistically significant at the end of the study. *Conclusion*: The results of our study indicate the functional treatment provides a better functional support and pain reduction than a below-knee cast.***

Keywords: Lateral malleolus, functional treatment, immobilisation, visual analog score, Karlsson score

1. Introduction

Acute ankle sprains account for an estimated of 7-10% of all emergency visits. The mechanism of such injury is secondary to an inversion of a planterflexed foot.[1,2] The grading of such injuries was proposed by Crichton on the basis of its severity[1], comprising of three grades:-

- Grade I → stretched ligament (not torn), 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.

In spite of high frequency of such injuries, there is no single acceptable treatment that is preferable to other current treatments. These injuries can cause pain and other impairments, resulting in utilisation of healthcare resources and absteenism from work. Hence timely diagnosis and treatment of such injuries are helpful in the final outcome of such treatment.[3] The treatment modality in form of RICE (rest, ice, compression and elevation) is still in use for the initial treatment. The common modes of treatment include surgical repair of injuries, plaster immobilisation, elastic bandage, steroid injection and prescription of non-steroid analgesics.[4] Decreasing the time period, achieving a stable ankle joint, preventing recurrence and repetition of such injuries are the most important objectives to be attained during treatment of acute ankle sprains.

Conventional treatment with early mobilisation with weight bearing with or without the use of external support, in the form of tape, brace or elastic bandages, is preferred over plaster of Paris (POP) as they have better functional outcomes as per previous studies.[5] A met-analysis study conducted by Kerkhoffs and colleagues comparing the functional outcomes of cast immobilisation and functional treatment, showed no difference between the two groups.[6] Lamb et al, in their study showed that a below-knee POP cast application can increase the rate of healing of a sprained ankle, with their results showing that cast immobilisation was superior to the other treatment modalities during the first three months, however after 9 months, both equally effective.[7] However, long-term cast immobilisation makes the soft tissues around the joint tender and short, thus, increasing the disability, especially in case of athletes. Therefore, functional treatment has been resorted to in order to regain the pre-injury range of motion faster and to reduce the incidence of muscular atrophy.

This study assesses functional treatment versus cast immobilisation for treatment of lateral ankle sprains (Grade I and II), employing the VAS scoring for pain assessment and Karlsson scoring for functional assessment.

2. Materials and Methods

This study was performed In the Department of Orthopaedics, Father Mullers Medical College, Mangalore from January 2016 to September 2016. During this period,

80 patients were enrolled, who fulfilled the inclusion criteria:

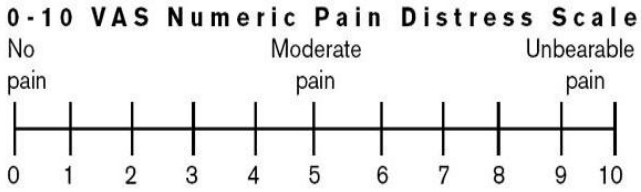
- Grade I and II lateral ankle sprain;
- 18-45 years of age for both sexes;
- Presentation within 48 hours of injury.

X-rays of the ankle (both anteroposterior and lateral views) were taken to rule out any fractures. Patients with fractures; multiple injuries; any neurological or musculoskeletal illness; or any co-morbidity associated with long-term disability, were excluded from the study.

All patients gave their informed consent prior to the inclusion in the study, following which they were randomised such that each patient was allocated to either functional treatment (group A) or treatment with a below-knee synthetic cast (group B). The standardised treatment based on RICE (rest, ice, compression and elevation) protocol was given to all patients. The patients in the functional treatment group were put on ankle brace and subjected to early mobilisation and range of motion exercises from day 4.

Patients were followed up at 2 weeks and again at 6 weeks. Pain was recorded on the visual analog scale (VAS) and also Karlsson score were noted at the time of presentation, and again at 2 and 6 weeks. At the end of the study, only 65 patients completed the entire follow-up of which 33 belonged to functional treatment group (group A) and the remainder were of the cast immobilisation group (group B).

All data collected was expressed as Mean +/- SD and p value <0.05 was considered significant.



3. Results

Among the 65 patients who completed the study, 33 were assigned to the functional treatment group and the other 32 were assigned to the cast immobilisation group. The mean +/- SD age of patients in the functional treatment group was 29.77 +/- 6.71 years, and that of the patients in the cast immobilisation group was 30.85 +/- 6.40 years. The dominant ankle involved was the right one in the functional treatment group in 18 patients and left ankle in 15 patients, while right and left ankles were equally affected in the cast immobilisation group (i.e., there were 16 right ankles and 16 left ankles that were affected). There was a male predominance noted in both the groups (i.e., 19 in the functional treatment group and 20 in the cast immobilisation group), while the remaining patients were females.

Table 1: Pre-treatment characteristics

Variable	Group A (Functional Treatment)	Group B (Cast Immobilisation)
Age (years)	29.77 +/- 6.71	30.85 +/- 6.40
Ankle		
Right	18	16
Left	15	16
Sex		
Male	19	20
Female	14	12

The mean visual analog scale score at presentation was 8.36 +/- 0.94 in the functional treatment group and 8.23 +/- 0.92 in the cast immobilisation group. The difference in the scores of the groups was statistically nonsignificant (p=0.436). The mean visual analog scale score at 2 weeks was 6.17 +/- 0.77 in the functional treatment group and 6.26 +/- 0.11 in the cast immobilisation group. The difference in the scores of the groups was statistically nonsignificant (p=0.378). The mean visual analog scale score at presentation was 3.86 +/- 0.83 in the functional treatment group and 4.95 +/- 0.84 in the cast immobilisation group. The difference in the scores of the groups was statistically significant (p<0.001).

Table 2: Visual Analog Scale score at presentation, 2 weeks and 6 weeks

Variable	Group A (Functional Treatment)	Group B (Cast Immobilisation)	p value
At presentation	8.36 +/- 0.94	8.23 +/- 0.92	0.436
At 2 weeks	6.17 +/- 0.77	6.26 +/- 0.11	0.378
At 6 weeks	3.86 +/- 0.83	4.95 +/- 0.84	<0.001

The Karlsson score at presentation was 21.19 +/- 6.35 in the functional treatment group and 23.68 +/- 5.14 in the cast immobilisation group. The difference in the scores of the groups was statistically nonsignificant (p=0.579). The Karlsson score at 2 weeks was 52.05 +/- 6.43 in the functional treatment group and 52.37 +/- 5.35 in the cast immobilisation group. The difference in the scores of the groups was statistically nonsignificant (p=0.767). The Karlsson score at presentation was 76.25 +/- 10.65 in the functional treatment group and 70.20 +/- 6.39 in the cast immobilisation group. The difference in the scores of the groups was statistically significant (p<0.001).

Table 3: Karlsson scoring at presentation, 2 weeks and 6 weeks (Appendix I)

Variable	Group A (Functional Treatment)	Group B (Cast Immobilisation)	p value
At presentation	21.19 +/- 6.35	23.68 +/- 5.14	0.579
At 2 weeks	52.05 +/- 6.43	52.37 +/- 5.35	0.767
At 6 weeks	76.25 +/- 10.65	70.20 +/- 6.39	<0.001

4. Discussion

The results of our study indicate that the functional treatment is a better treatment than cast immobilization for lateral ankle sprains (grade I and II) in alleviating pain, improving range of motion and functionality. Acute ankle injuries are among the most prevalent injuries of the athletes' musculoskeletal system.[8] Untreated ankle sprain

will cause chronic problems, reduced range of motion, pain and instability of ankle joint which impact activities of daily living.[9]

The standard treatment of acute ankle sprains includes supporting, resting, application of ice pack and elevation of the limb. The lifting of the limb helps reduce the inflammation.[10] Cast immobilization, surgical repair and functional treatments are considered the treatment options for ankle sprains.[11,12] Cast immobilization via a below-knee plaster cast is considered as a double edged sword, as it can help in order to fasten the healing process but can result in functional impairment through muscle wasting. Long-term immobilization of ankle causes muscular atrophy and negative impacts on muscle fibers type I.[10]
In our study, more male patients were affected, both in the functional treatment and cast immobilization group. A study by Hosea and colleagues[13] showed that grade I injuries were more common among females while the difference between the sexes was not statistically significant for grade II and III injuries. In our study right ankle was more affected than left in the functional treatment group while both ankles were equally affected in the cast immobilization group. Many studies have shown that limb dominance does not manifest itself in ankle injuries, whereas, one study did prove that limb dominance does indeed play an important role in determining the injury mechanism.[14]

The mean visual analog scale score was slightly higher in the functional treatment group in comparison to cast immobilization group, while it was lower in the second and sixth week. The difference between the two groups was statistically significant in the sixth week, showing that functional treatment is superior to below-knee cast in terms of pain alleviation in lateral ankle sprains. A prospective study conducted with use of elastic wraps for lateral ankle sprains showed much faster reduction in pain by third week of treatment.[15] A meta-analysis showed that functional treatment provided better outcomes in terms of pain reduction than cast immobilization for mild to moderate injuries, however immobilization can hasten recovery for severe sprains.[16]

As far as ankle rehabilitation is concerned, several studies have shown that active early rehabilitation improves the joint proprioception, thereby, reducing the rate of re-injury.[17,18,19] In our study, the Karlsson scores were higher in the cast immobilization group at the start of the study, but they were significantly lower at 6th week when compared to functional treatment group. Eiff et al [15] in his study found that patients treated with functional treatment returned to work much earlier when compared to those treated with cast immobilization. Functionality is improved by early mobilization, and this leads to an earlier return to activities of daily life.[20] Many studies have shown that functional treatment helps patient to better maintain their mobility that can strengthen the ankle joint and thus prevent further incidence of ankle sprains.[21,22,23]

This study had a major limitation of a small observation period as we did not follow up the patients beyond 6 weeks post-injury, which would have helped us assess long term benefits of the treatment.

5. Conclusion

Based on our study, functional treatment provides better functional outcomes and pain reduction than cast immobilization.

References

[1] Lamb SE, Nakash RA, Withers EJ, Clark M, Marsh JL, Wilson S, Hutton JL, Szczepura A, Dale JR, Cooke MW. Clinical and cost effectiveness of mechanical support for severe ankle sprains: design of a randomised controlled trial in the emergency department [ISRCTN 37807450]. BMC musculoskeletal disorders. 2005 Jan 13;6(1):1.
[2] Wolfe MW. Management of ankle sprains. American family physician. 2001 Jan 1;63(1).
[3] Dubin JC, Comeau D, McClelland RI, Dubin RA, Ferrel E. Lateral and syndesmotic ankle sprain injuries: a narrative literature review. Journal of chiropractic medicine. 2011 Sep 30;10(3):204-19.
[4] Ekman EF, Fiechtner JJ, Levy S, Fort JG. Efficacy of celecoxib versus ibuprofen in the treatment of acute pain: a multicenter, double-blind, randomized controlled trial in acute ankle sprain. American journal of orthopedics (Belle Mead, NJ). 2002 Aug;31(8):445-51.
[5] Kemler E, van de Port I, Backx F, van Dijk CN. A systematic review on the treatment of acute ankle sprain. Sports medicine. 2011 Mar 1;41(3):185-97.
[6] Kerkhoffs GM, Struijs PA, Marti RK, Assendelft WJ, Blankevoort L, Van Dijk CN. Different functional treatment strategies for acute lateral ankle ligament injuries in adults. The cochrane library. 2002.
[7] Lamb SE, Marsh JL, Hutton JL, Nakash R, Cooke MW, Collaborative Ankle Support Trial (CAST Group. Mechanical supports for acute, severe ankle sprain: a pragmatic, multicentre, randomised controlled trial. The Lancet. 2009 Feb 20;373(9663):575-81.
[8] Noh JH, Yang BG, Yi SR, Lee SH, Song CH. Outcome of the functional treatment of first-time ankle inversion injury. Journal of Orthopaedic Science. 2010 Jul 1;15(4):524-30.
[9] Purcell SB, Schuckman BE, Docherty CL, Schrader J, Poppy W. Differences in ankle range of motion before and after exercise in 2 tape conditions. The American journal of sports medicine. 2009 Feb 1;37(2):383-9.
[10] Refshauge KM, Raymond J, Kilbreath SL, Pengel L, Heijnen I. The effect of ankle taping on detection of inversion-eversion movements in participants with recurrent ankle sprain. The American journal of sports medicine. 2009 Feb 1;37(2):371-5.
[11] Klenerman L. The management of the sprained ankle. JOURNAL OF BONE AND JOINT SURGERY-BRITISH VOLUME-. 1998 Jan 1;80:11-2.
[12] Ogilvie-Harris DJ, Gilbart M. Treatment modalities for soft tissue injuries of the ankle: a critical review. Clinical Journal of Sport Medicine. 1995 Jul 1;5(3):175-86.
[13] Hosea TM, Carey CC, Harrer MF. The gender issue: epidemiology of ankle injuries in athletes who participate in basketball. Clinical orthopaedics and related research. 2000 Mar 1;372:45-9.

[14] Beynnon BD, Murphy DF, Alosa DM. Predictive factors for lateral ankle sprains: a literature review. Journal of athletic training. 2002 Oct 1;37(4):376.
[15] Eiff MP, Smith AT, Smith GE. Early mobilization versus immobilization in the treatment of lateral ankle sprains. The American journal of sports medicine. 1994 Jan 1;22(1):83-8.
[16] Seah R, Mani-Babu S. Managing ankle sprains in primary care: what is best practice? A systematic review of the last 10 years of evidence. British medical bulletin. 2010 Aug 14:ldq028.
[17] Uh BS, Beynnon BD, Helie BV, Alosa DM, Renstrom PA. The Benefit of a Single-Leg Strength Training Program For the Muscles Around the Untrained Ankle A Prospective, Randomized, Controlled Study. The American journal of sports medicine. 2000 Jul 1;28(4):568-73.
[18] Eils E, Rosenbaum D. A multi-station proprioceptive exercise program in patients with ankle instability. Medicine and science in sports and exercise. 2001 Dec 1;33(12):1991-8.
[19] Matsusaka N, Yokoyama S, Tsurusaki T, Inokuchi S, Okita M. Effect of ankle disk training combined with tactile stimulation to the leg and foot on functional instability of the ankle. The American journal of sports medicine. 2001 Jan 1;29(1):25-30.
[20] Denegar CR, Miller III SJ. Can chronic ankle instability be prevented? Rethinking management of lateral ankle sprains. Journal of athletic training. 2002 Oct 1;37(4):430.
[21] McKay GD, Goldie PA, Payne WR, Oakes BW. Ankle injuries in basketball: injury rate and risk factors. British Journal of Sports Medicine. 2001 Apr 1;35(2):103-8.
[22] Surve I, Schwellnus MP, Noakes T, Lombard C. A fivefold reduction in the incidence of recurrent ankle sprains in soccer players using the Sport-Stirrup orthosis. The American Journal of Sports Medicine. 1994 Sep;22(5):601-6.
[23] Sitler M, Ryan J, Wheeler B, McBride J, Arciero R, Anderson J, Horodyski M. The efficacy of a semirigid ankle stabilizer to reduce acute ankle injuries in basketball a randomized clinical study at West Point. The American Journal of Sports Medicine. 1994 Jul 1;22(4):454-61.