IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 21, Issue 9 Ser.7 (September. 2022), PP 01-06
www.iosrjournals.org

Comparative Study on Management of Acute Lateral Ankle Sprain using Immobilization with Below Knee Slab versus Flexible Ankle Brace

Dr ShivamGarg, Dr Rahul Rathi,Dr Vishwas, Dr Laxmi Narayan Meena*
(Department of orthopaedics, Pacific Institute of Medical Sciences, Udaipur, India)
**Corresponding Author: Dr Laxmi Narayan Meena*
(Associate professor, Department of orthopaedics, Pacific Institute of Medical Sciences, Udaipur, India

Abstract:
Introduction: *Amongst musculoskeletal injuries, ankle ligament sprains are the most common sports injuries. Ankle sprains are graded (1 to 3) based upon their severity and are currently managedvia 3 methods: (1) immobilization with below knee slab, (2) immobilization with flexible ankle brace (functional brace) and (3) surgical treatment. The purpose of this study is to compare the functional outcome of the ankle joint after an inversion injurymanaged with immobilization with Below Knee Slab against flexible ankle brace.*
Methods: *Prospective study was conducted indepartment of orthopaedics at PIMSTeaching Hospital during period august 2020 to January 2022. 60 patients presented with acute lateral ankle sprain in our hospital and they were consecutively randomized into two equal groups each having 30 patients:*
One group was treated using immobilization with Below Knee Slab and the other with aflexible ankle brace. AllPatients were treated with rest, ice fomentation, andelevation of limb along with analgesics. Patients were reviewed after 10 days, and 30days. Primaryoutcome measure was Ankle joint function which was assessed at 30days using the modified Karlssonscoringmethod (maximum score 90). Secondary outcome measure was Pain assessed with VAS score on day of presentation in hospital and day 10.
Results: *30 patients treated withimmobilization using Below Knee Slab and remaining 30 patients treated withimmobilization usingflexible ankle brace. The age of the patients ranged from 16 to 50 years with the mean of29.55±9.25 years.The difference in mean age (in years) was same in both groups (P-0.7105)thedistribution of gender and occupation in both groups were homogeneous (P<0.0001). The karlsson'sscore mean for below knee slab group was 73.0±7.8 (p-value< 0.0001) and for flexible ankle brace group was 55.4±7.3. Thus therewas found a significant difference in Karlsson's score between the two groups showing betterimprovement in ankle joint function in patients receivingimmobilization usingbelow knee slab.The VAS Score mean for below knee slab group was (3±0.71) and for flexible ankle brace group was (3.5±0.9).There is significant difference in the painreliefbetween both groups at end of the 10 dayswith p value <0.0001 showing better achievement of pain relief in below knee slab group .*
Conclusion: *The immobilizationwith below knee slab for the treatment of acute lateral ankle sprainsproduced a significant symptomatic improvement in ankle joint function as well as pain relief at 30 days compared with flexible ankle brace.*
Keywords:*Ankle Sprain; below knee slab;flexible ankle brace.*

Date of Submission: 08-09-2022 Date of Acceptance: 25-09-2022

I. Introduction

Now a days, musculoskeletal injuries are becoming more prevalent.Ankle ligament sprains are amongst common sports injuries, accounting for 19–23% of all sports injuries presenting to emergency departments.It has been estimated that an ankle injury occurs every day per 10 000 of the population. About 90% are inversion injuries affecting the lateral ligament complex. Ankle sprains have been classified into grades I, II, and III according to macroscopic appearance and clinical findings. (Figure 1)

TYPE OF INJURY	EXTENT OF INJURY	PHYSICAL FINDINGS
Grade I	Stretch of the ligament with microscopic but not macroscopic tearing	Minor swelling but no joint instability
Grade II	Involves partial tearing of the particular ligament	Minor to moderate swelling and some instability of the affected ankle
Grade III	Involves complete rupture of the ligament	Significant swelling, tenderness, and ecchymosis; instability of the joint and inability to bear weight

Figure 1

For this study, the terms mild, moderate, and severe were used corresponding to grades I, II, and III respectively.

Ankle sprains found 4.7-24.4% of all injuries in an individual. Ankle sprains produce 25% of all time loss due to injury in football, basketball, and similar sports injuries.[1] It constitutes approximately one quarter of all musculoskeletal injuries.[2] In classification systemdescribed by Bergfeldet al.[2]athere often appears to be no common regimen for theirmanagement, with a wide spectrum of treatment optionsare available. But basically treatment modality is non-surgical and consists of two different treatment optionswhich includes immobilization and the other are being functional treatment.Functional treatment consists of a program of mobilization that may include some initial externalsupport to the ankle. The support may be in the form of anelasticated bandage, strapping, lace-up boots or an externalorthotics braces. The orthotics may preventinversion/eversion but will allow some degree of dorsiflexion/plantar flexion. Immobilization is defined as any therapy thatprevents movement of the ankle joint in both dorsiflexion/plantar flexion and inversion/eversion. Immobilization can be achievedby cast, posterior slab splint or boots.Usually immobilization of the limb is done usingbelow knee posterior slab[3] .This study aims to determine the difference in functional outcome between the immobilization using below knee slab and flexible ankle brace asa form of treatment of moderate or severe lateral ankle sprain.

II. Methods

The study was conducted in orthopaedic department of PIMS Hospital during a period of Aug 20 to Jan 22.Only those patient included in study which fulfilled inclusion criteria.60 patients presented consecutively with moderate or severe acute lateral ligament sprain after an ankle injury.They were randomized into two identical groups. Patient were allocated to use either a Below Knee Posterior Slab (Figure 2) or Flexible ankle brace (Figure 3). A standard Performa for all patients was completed detailing age, sex, time of presentation, occupation, left or right ankle injured, and previous injuries. All patients included in the study were advisedrest, ice fomentation and elevation of limb. Analgesia was used and patients were advised not to bear weight up to first follow up. Follow up was doneat10^{th} day followed by 30^{th} day at orthopaedics OPD.

Figure 2 BELOW KNEE SLAB

Figure 3 FLEXIBLE ANKLE BRACE

Inclusion criteria:

Patients with acute lateral ankle sprain with following conditions were included from our study.

1) Ankle sprain Grade II and Grade III following inversion injury of ankle.
2) Age 16 years to 50 years.
3) Presenting up to 72 hours of injury.

Exclusion criteria:

Patients with acute lateral ankle sprain with following conditions were excluded from our study.

1) Chronic ankle sprain.
2) Age <16 years and >50 years.
3) Associated Deltoid ligament injuries.
4) Cases presenting after 72 hours of injury.
5) Associated Fractures and Multiple injuries.
6) Other comorbidities like Dementia, Mental illness,alcohol or drugs dependence.
7) Neurological conditions.

The primary outcome measured was the ankle joint function. This was assessed at 10 days and 30 days using a modified version of the Karlsson's scoring scale.[4](Table 1).This is a statistically validated scoring scale devised by Karlsson and Peterson.

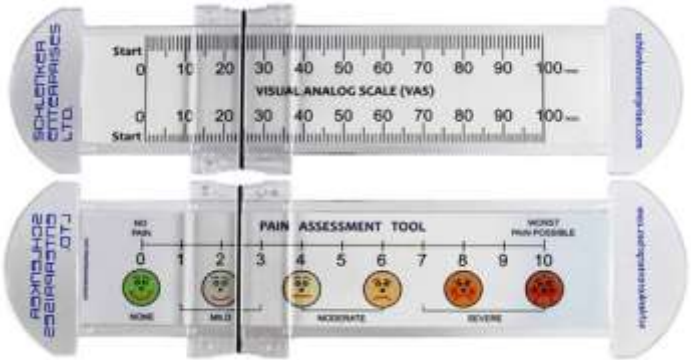
Table 1 Karlsson scoring scale

Parameters	Degree	Score
Pain	-None -During exercise -Walking on uneven surface -Walking on even surface -Constant (severe)	20 15 10 5 0
Swelling	-None -After exercise -Constant	10 5 0
Instability (subjective)	-None	15

	-Walking on uneven ground -Walking on even ground -Constant (severe) using ankle -Support	10 5 0
Stiffness	-None -Moderate (morning, after exercise) -Marked (constant, severe)	5 2 0
Stair climbing	-No problems -Impaired (instability) -Impossible	10 5 0
Running	-No problems -Impaired -Impossible	10 5 0
Work activities	-Same as before injury -Same work, less sports, normal leisure activities -Lighter work, no sports, normal leisure activities -Severely impaired work, decreased leisure activities	15 10 5 0
Requirement of ankle Support	-None(not required) -Ankle support required during exercise -Ankle support required during daily activities	5 2 0

Secondary outcome measures involved pain relief assessed using VAS score at the time of presentation in hospital followed by 10th day. Compared with initial presentation. Pain scores were obtained using a standard subjective visual analogue scale from 0 to 10, with 0 analogous to ‘‘no pain’’ and 10 equivalent to ‘‘maximal pain’’(Figure 4).

Figure 4: VAS SCALE



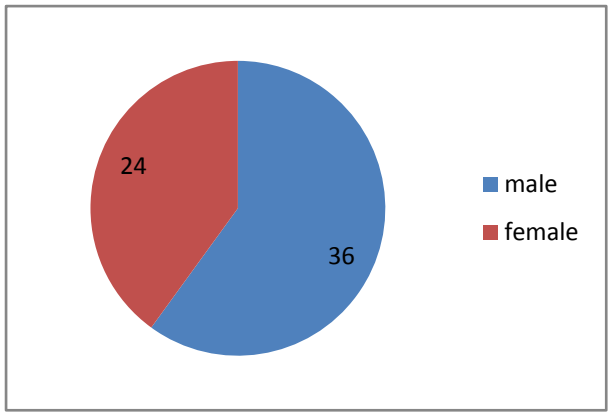
Statistical methods

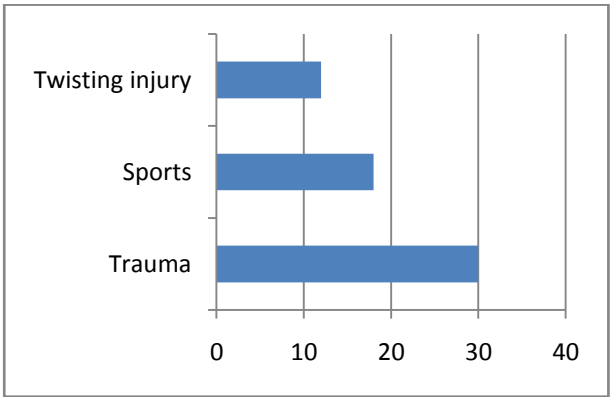
Univariate analyses were performed using Student’s unpaired t test, the Mann-Whitney U test, the x2 test, or Fisher’s exact test, which was appropriate. Multivariate analysis was performed to correct for confounding factors using hierarchical multiple regression. All tests were two tailed, and statistical significance was regarded as p 0.05. The absence of published data on the variance of the Karlsson score made a prospective power calculation for our primary outcome measure impossible.

III. Results

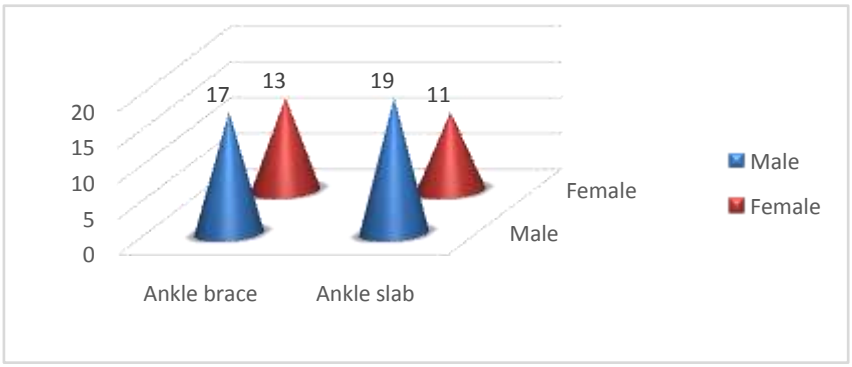
60 patients who sustained ankle sprain were enrolled in the study. They were followed up for the period of 30 days and assessed for functional outcome and pain relief. The distribution of age was homogeneous (p-0.7105).The incidence of injury in right sidewas more commonthen left side.

Sex distributionMode of injury





Treatment method in Patients



IV. Discussion

A sprained ankle is a common injury seen in orthopaedic departments.There is up till now no gold standardmethod of management used universally for this. Instead clinicians trust on a combination ofown experience andClinical judgment.

Management strategies can be divided into three main categories: cast/splint immobilization, functional treatment (flexible ankle brace) and operative repair. It is difficult to compare the results of studies directly, but a few common themes have emerged for comparison.

We also realized that a majority of subjects who suffered acute injurieswere having associated injurieswhile some of them were having chronic lateral ankle sprain making it difficult to determine the severity and extent of the injury that was studied. Therefore, the objectiveof our investigation was to determine theoutcome of acute ankle sprains and identify the best method between two methods ofconservative treatment with the goal of returning patients to their preinjury activity levels. The two methods wereimmobilization with below knee posterior slab and functionaltreatment with flexibleankle brace.

According to Wolf Petersen study a short period of immobilization in a short legs lab leads to a faster recovery at 3 months compared to a compression band age.[5]

Our study showed that there was statistically significant difference in the functional outcome shown by Karlsson score between the subjects treated with below knee posterior slab (73.0±7.8.) compared with flexible ankle brace (55.4±7.3) with p-value of 0.0005 at the end of 30 days.(Table 2)

Table 2: Results of Karlsson score

KARLSSON SCORE			t-Statistics	P-VALUE
	MEAN	STANDARD DEVIATION		
AFTER 10 DAYS			10.74	<0.0001
ANKLE FLEXIBLE BRACE	36.57	6.40		
BELOW KNEE	55.57	7.28		

SLAB				
AFTER 30 DAYS			8.93	<0.0001
ANKLE FLEXIBLE BRACE	55.47	7.36		
BELOW KNEE SLAB	73.07	7.90		

Boyce et al in their study to determine thefunctional outcome of the ankle joint after a moderate inversion injury in general population, comparing standard treatment with an elastic support bandage againstan Aircast ankle brace found the Karlsson score was significantly higher in theAircast ankle Brace group than in the elastic bandage group at 10 days (mean 50 v 35,p = 0.028, 95% confidence interval (CI) 1.7 to 27.7) and one month (mean 68 v 55, p = 0.029, 95% ci 1.4 to 24.8) (student's t test).[6]

A multicentre randomised trial with blinded assessment of outcome of 584 participants with severe ankle sprain promoted the use of a cast for treatment of acutely sprained ankles.[7,8]but this trial suffers from various shortcomings and failed to compare the different methods of immobilization with the current gold standard, i.e. functional treatment.

In our study, a statistically significant improvement in the functional outcome and pain of the ankle joint was present in the below knee slab group at 30 days follow up. The Karlsson scoring scale and VAS was used, as it provided a practical and reproducible method of assessing ankle joint function.The scale reflects many of the subjective measures that may be considered a determinant of adequate ankle function.

We did not analyse the specific components of the scorethat contributed to the overall differences between the groups.This result only proves that immobilization withbelow knee slabis superior to aflexible ankle brace outcome. It does not provethat patients treated with flexible ankle brace derived no benefit. Interestingly, both groups had a high Karlsson's score at 30 days and improvement with decreased swelling and pain, suggesting that, independent of the treatment used, the injury will improve progressively with time.

V. Conclusion

The results in our study shows use of abelow knee slab in the treatment of acute ankle sprains, presenting within 72 hours of injury, produces a significant improvement in ankle joint function, at 30 days, compared with standardmanagement with flexible ankle brace. Further research is necessary on a bigger sample group to confirm this hypothesis, with the opportunity of producing a cost effective analysis of any perceived advantages.

References

[1]. S H Boyce, M A Quigley, S CampbelManagementof ankle sprains: a randomised controlled trial of thetreatment of inversion injuries using an elastic supportbandage or an Aircast ankle brace Br J Sports Med2005; 39:91–96. doi: 10.1136/bjsm.
[2]. Keeman JN. Commentarrenkelspecial. ReumaTrauma. 1990; 1:34-35
[3]. Bergfeld J, Cox J, Drez D, et al. Symposium:management of acuteankle sprains. ContempOrthop.1986;13:83-116.003.009233 2
[4]. Karlsson J, Peterson L. Evaluation of ankle jointfunction: the use of a scoring scale. The Foot1991;1:15–19.
[5]. Treatment of acute ankle ligament injuries: a systematic revie;Wolf Petersen · Ingo Volker Rembitzki · Andreas GöseleKoppenburg · Andre Ellermann · Christian Liebau · Gerd Peter Brüggemann · Raymond Best Arch Orthop Trauma Surg (2013) 133:1129–1141.
[6]. S H Boyce . "Management of Ankle Sprains: A Randomised Controlled Trial of the Treatment of Inversion Injuries Using an Elastic Support Bandage or an Aircast Ankle Brace - PubMed." PubMed, 1 Feb. 2005, pubmed.ncbi.nlm.nih.gov/15665204.
[7]. Lamb SE, Marsh JL, Hutton JL, et al. Mechanical supports for acute, severe ankle sprain: a pragmatic, multicentre, randomised controlled trial. Lancet 2009; 373:575-81.
[8]. Callaghan M. Role of ankle taping and bracing in the athlete. Br J Sports Med 1997;31:102–8.

Dr Laxmi Narayan Meena, et. al. "Comparative Study on Management of Acute Lateral Ankle Sprain using Immobilization with Below Knee Slab versus Flexible Ankle Brace." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 21(09), 2022, pp. 01-06.