

CASE REPORT

Impact of Total Contact Plaster Boot via off Loading Practice in Trophic Ulcers of the Feet: Case Series

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ABSTRAK

Ulser trofik telah muncul sebagai satu daripada komplikasi utama diabetes mellitus dan penyakit Hansen. Dalam kes bersiri ini, kesan penyembuhan ulser trofik menggunakan 'but plaster bersentuhan penuh' yang diperbuat daripada plaster Paris dikaji ke atas 10 subjek. Seramai lima subjek adalah pesakit diabetes mellitus manakala lima subjek lagi adalah pesakit penyakit Hansen. Saiz luka ulser sebelum dan selepas rawatan 'but plaster bersentuhan penuh' diukur sebagai hasil kajian. Kesemua 10 subjek menunjukkan pengurangan saiz luka selepas 15 hari penggunaan 'but plaster bersentuhan penuh'. Tiada kesan mudarat dikaitkan dengan rawatan ini. Pesakit dengan ulser trofik boleh menerima faedah daripada rawatan 'but plaster bersentuhan penuh'.

Kata kunci: penyakit Hansen, diabetes melitus, ulsertrofik, but plaster bersentuhan penuh

ABSTRACT

Trophic ulcers have emerged as one of the major complications following diabetes mellitus (DM) and Hansen's diseases (HD). In this case series, the study attempted total contact plaster boot using a readily available plaster of Paris to treat trophic ulcer for 10 subjects. A total of five subjects with DM and five subjects with HD were included based on the study criteria. Pre and post test measure of wound measurement size following total contact plaster boot were taken as an outcome measure. All ten subjects showed decrease in size of wound following fifteen days of treatment. No adverse effects were associated with this type of treatment. Subjects

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with trophic ulcer may benefit from the application of total contact plaster boot.

Keywords: Hansen's disease, diabetic mellitus, foot ulcer, plaster casts

INTRODUCTION

DM and HD have become an increasingly significant public health concern and the prevalence of which is increasing globally in both developed and developing countries like Asia, Africa and Europe (Abbott et al. 2005). Diabetes contributes to about more than 60% of the world's diabetic population and leprosy accounts to about 189,018 for the first quarter of 2013 in Asia and Africa (Ramachandran et al. 2012). Complications arises from lower limb in persons with DM and HD ranges from peripheral vasoconstriction, ischemia, neuropathy which subsequently leads to foot ulcers and infections (Wu et al. 2007). These ulcers continue to cause great morbidity in these special populations. Hence, the care for the ulcers of the plantar aspects requires multi disciplinary approach which will improve subject's functional capacity and quality of life (Frykberg 2002). Recommended management of these ulcers includes foot assessment, intensive education, therapeutic shoes, padded stockings, infection control, debridement, pressure mitigation, total contact cast, Ultrasound therapy, Laser, cryotherapy and exercises (Potturi & Reddy 2014).

Although many treatment options were put forth for treating the ulcers, total contact casting for promoting healing proved to be an effective method. Nevertheless, the techniques

of application and the materials vary in each and every study. Apart from that, limited experience in plaster boot cast application among the region has suggested that total contact plaster boot may resolve ulcers. Hence, keeping in view of difference in techniques and cost effectiveness, we have designed a modified methodological approach of applying this boot over a series of patients who are indulged with ulcers via off loading method using soft padding. This case series, report the results obtained in a group of subjects with foot ulcers treated with total contact plaster boot in a rural based institution.

MATERIALS AND METHODS

Subjects who are diagnosed with non-healed plantar ulcers with age range between 40 to 60 years old were recruited to participate in this study. Those, who are diagnosed to have HD and DM with non-healed plantar ulcers, were recruited for the study and those who had infected ulcers, visual problems that could affect balance, an ulcer on the contra lateral foot were excluded from the study (Faglia et al. 2010). The study protocol was approved by institutional ethics committee. A total of 13 potential subjects were screened. Three subjects were excluded as they didn't meet the criteria set for the study. Thus, 10 subjects were included in the study. Following screening for infective pathology, subjects consent

was obtained and they were admitted to Division of Physical Medicine and Rehabilitation (DPMR), Rajah Muthiah Medical College & Hospital (RMMC & H), Annamalai Nagar, India.

PROCEDURES: MEASUREMENT OF WOUND

Initially, demographic details such as age, sex were recorded in the data recording sheet which was prepared for the present study. Then details on duration of diabetes, ulcer characteristics were recorded as shown in Table 1. The measurement of wound size was traced by placing a tracing paper over the wound and it was reinforced with another tracing paper. Subsequently, a pencil was used to trace the circumference of the wound. After marking, the tracing paper which was kept over the wound, the tracing paper was discarded to prevent infection. Then the reinforced tracing paper was kept for further accomplishment. The wound surface area was calculated by using (Area = length X breadth of the wound). Length was measured between 12° to 6° clockwise directions and breadth was measured between 3° to 9° clockwise directions which is the widest part perpendicular to the length (Srivastava & Dugaprasad 2008).

After measurement of wound, the subjects were prepared for casting. Initially they were positioned in supine lying, the wound was cleaned properly and soft cotton padding was kept over the wound as a source of off loading, then the plaster boot was applied from head of metatarsal to ankle joint with the help of plaster of Paris. Appropriate care was taken such that the plaster did not disturb

the ankle movements. After completing the casting procedure, the subjects were discharged and are advised to report 15 days following plaster cast application. Instruction and pamphlets related to the study were given to report immediately to the hospital when they encounter signs of fever, lymphadenopathy and foul smell from the wound. Subjects were advised to cover the plaster boot with the help of plastic bag when necessary to prevent wetting.

RESULTS

Totally ten subjects were enrolled and both genders contributed equally to the study with a mean age of 48.4 years old. Almost 40 percent of the subjects had ulcers in 1st metatarsal region and 30 percent had ulcers in the region of heal. Comparison of pre and post test values of wound size area was computed using paired‘t’ test and the statistical significance was kept at the level of 0.5. The comparisons of pre and post test measures of wound

Table 1: Base line characteristics of all patients treated with total contact cast

Patient Characteristics	n=10
Age (years) 40-60	Mean±sd (48.4±5.03)
Gender	
Male & Female	5&5
Ulcer characteristics	
Size (cm ²)	Mean±sd (7.33±2.16)
Duration (months)	6 – 9
Location	
1st metatarsal	4
3rd metatarsal	1
Calcaneal region (heal)	3
Lateral aspect of sole	2

Table 2: Details of the diagnosis and wound measurement before and after treatment

Diagnosis	Wound Area in centimeters prior to treatment	Wound Area in centimetres after treatment
DM with PN, TU in 1st metatarsal head (Rt) side	3.68	0.25
DM with PN, TU (Lt) heal.	4.68	0.25
DM with PN, TU in 1st metatarsal head (Lt) side	5.6	0.16
DM with PN, TU in Lateral aspect of the (Lt) sole	7.04	0.16
DM with PN, TU of (Rt) heel	9.24	0.25
DM with PN, TU in 1st metatarsal head (Rt)	7.2	0.25
HD with TU in 1st metatarsal head (Lt)side	9.25	0.25
HD with TU in 3rd metatarsal head (Rt) side	7.2	0.16
HD with TU in lateral aspect of the foot (Rt) side	9.72	0.64
HD with TU n heel of the foot (Rt) side	9.45	0.64

*DM:Diabetes Mellitus, *HD:Hansen's disease, *PN:Peripheral Neuropathy, *TU: Trophic Ulcer

size area are shown in Table 2. Results showed that there was significant difference between pre and post test values of wound size area ($p < 0.05$), which shows that total contact cast boot promoted wound healing among these populations.

DISCUSSION

The present study found out that total contact plaster boot applied to plantar ulcers of the foot via off loading methods promotes wound healing. The results of this study will now be compared to the findings of previous work. The present study are consistent with the findings of an earlier study which was carried out on off loading methodology on diabetic foot comparing total contact casting (TCC), removable cast walkers (RCW) and half-shoes in which they have concluded that TCC appears to heal a higher proportion of wounds in a lesser duration of time than two other widely used off-loading modalities, the RCW and the half-shoe (Armstrong et

al. 2001).

Similarly, another randomized controlled trail which was carried out in the year 2010, on forty five patients on removable and non removable cast concluded that removable cast walker was equivalent in efficacy to the TCC in terms of ulcer reduction. This study has similar results to our study in which TCC was used in two groups of populations for reducing the ulcer (Faglia et al. 2010).

The present study utilized plaster of Paris materials for casting. However, the materials and the techniques followed in our present study are different from the studies in which fibreglass bandages and other sort of materials were used to cast the feet. A systematic review published in the year 2013 concluded that non-removable off-loading device promotes better healing than removable off-loading devices (Morona et al. 2013).

These findings further support the idea of application of TCC for DM and HD foot ulcer using plaster of Paris

which is cheaper and cost effective when compared to other materials utilized in other studies. The results of our study indicate that TCC applied through an easily available material like plaster of Paris in a rural set up where the series of cases were treated, proved to be an effective option in managing a complication like trophic ulcers of the feet for both DM and HD.

CONCLUSION

The fact designates that the application of total contact plaster boot is valuable in the administration of both Diabetic and Hansen's disease trophic ulcers of the feet.

ACKNOWLEDGMENT

The authors are grateful to the subjects who contributed for the study.

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