

Original Research Article

Saline dressing versus povidone iodine dressing in chronic diabetic foot ulcer healing: a prospective comparative study

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ABSTRACT

Background: Numerous topical agents are used for chronic diabetic foot ulcer (DFU) care and healing. In most of the hospitals in India povidone iodine is used topically for DFU dressing, however few other agents are more efficacious; the present study was aimed to compare the effect of povidone iodine and normal saline dressing in healing of DFU.

Methods: A total of 50 patients (25 patients in each arm of povidone Iodine and Saline dressing group) with complaints of chronic DFU attending surgery outpatient department of Rajarajeswari Medical College and Hospital were considered in this prospective comparative study from July 2017 to December 2018. Dressings were done on daily basis for a period of 6 weeks, and the results were compared on 2nd, 4th and 6th week, using reduction in surface area of chronic DFU as parameter of healing process.

Results: The mean surface area of wound in povidone iodine group was: baseline- 12.2 sq.cm, 2nd week- 11.7 sq.cm, 4th week- 10.6 sq.cm, 6th week- 9.8 sq.cm; While in saline group was: baseline- 13.3 sq.cm, 2nd week- 11.6 sq.cm, 4th week- 10.8 sq.cm, 6th week- 9.6 sq.cm. After 6 weeks, the mean reduction in surface area of wound is more in the saline dressing group compared with the povidone iodine dressing group and the results are statistically significant at a $p < 0.05$.

Conclusions: Saline dressing is more effective than povidone iodine dressing in achieving complete healing, reducing wound surface area, and increasing comfort in subjects with chronic DFU.

Keywords: Diabetic foot ulcer, Chronic DFU, Povidone iodine, Normal saline

INTRODUCTION

Diabetic foot ulcer (DFU) is the most costly and devastating complication of diabetes mellitus, which affect 15% of diabetic patients during their lifetime.¹ It is estimated that approximately 20% of hospital admissions among patients with DM are the result of DFU.² Early effective wound management plays an important role in preventing future complications and need for amputations. At our setup, these chronic diabetic wounds are managed by debridement and regular wound cleansing and dressing after thorough wash with betadine

(povidone iodine), hydrogen peroxide and normal saline. The wound is then covered either with povidone iodine soaked gauze or simply with normal saline soaked gauze. Povidone iodine is probably the best known antiseptic and has been used for more than a century.³ Though povidone iodine dressing is widely used method presently, some studies have shown that iodine delays wound healing.⁴⁻⁶ Hence our aim in this study was to compare the wound healing outcomes between the commonly used methods i.e. Normal saline dressing and povidone iodine dressing.

METHODS

A total of 50 patients, 25 patients in each arm of povidone iodine dressing group and Saline dressing group, with complaints of chronic DFU, attending Surgery Outpatient Department of Rajarajeswari medical college and hospital were considered in this study. Study was undertaken after the approval from the Hospital Ethics Committee. Prospective comparative study was done from July 2017 to December 2018. Informed written consent was taken from all the patients after explaining to them, the procedure and purpose of this study.

Inclusion criteria

Chronic DFUs of duration >6 weeks and size less than 15cm in maximum diameter were considered. Only clinically clean wounds without signs of acute inflammation, purulent discharge, or malodor were included.

Exclusion criteria

Patients who are not willing for the study, non DFUs, known allergy to iodine were excluded from the study.

Color duplex scan (arterial/venous doppler) to assess the vascular insufficiency, X-ray of the foot to rule out underlying osteomyelitis and wound bacterial culture swab were done routinely in all our patients.

Wound care

After cleaning the wounds, the povidone iodine/saline soaked gauze was applied over the wounds and covered with sterile dressing pad. The wound dressings were changed regularly every day for 6 weeks of follow-up period or till complete healing. The observations of wound healing status were made at 2 week intervals i.e. end of 2nd, 4th and 6th weeks, wherein the maximum dimensions of wound (length X breadth) in centimeters were recorded.

Statistical analysis

The study data was analyzed to evaluate the effect of topical povidone iodine dressing over saline dressing. SPSS software and Microsoft Excel software are used in this analysis. Chi-square test is used to evaluate the results and $p < 0.05$ is considered to be significant.

RESULTS

A total of 50 subjects with 25 in each arm of povidone iodine group and saline group completed the follow-up period. Among the total of 50 subjects, 37 (74%) were male and 13 (26%) were female. There was a male preponderance in both the groups (72% males in povidone iodine group and 76% males in saline group).

Mean age was 55.2 in povidone iodine group and 57.5 in saline dressing group. 40% in povidone iodine group and 48% in saline group had a habit of smoking and 36% in povidone iodine group and 48% in saline group had a habit of alcohol consumption. Among the blood investigations done, haemoglobin and serum albumin were taken into consideration for statistical analysis. Mean Hb in povidone iodine group was 12 gm% and in saline group was 11 gm%. Mean S. Albumin value in povidone iodine group was 3.06 g/dl and Saline group was 3.12 g/dl. Mean duration of diabetes was 10 years in povidone iodine group and 12.5 years in Saline group. Mean duration of existence of chronic wounds was 6 months in povidone iodine group and 7 months in saline group. Both the groups were comparable in terms of demographic characteristics, habits, lab investigations, duration of diabetes and duration of chronic diabetic foot ulcer (Table 1).

Table 1: Comparison of baseline characteristics of povidone iodine and saline dressing groups (n=25).

Characteristics	Povidone iodine dressing group	Saline dressing group
Age (yrs)	55.2	57.5
Gender		
Male	18 (72%)	19 (76%)
Female	7 (28%)	6 (24%)
Habits		
Smoking	10 (40%)	12 (48%)
Alcohol	9 (36%)	12 (48%)
Duration		
Diabetes (yrs)	10	12.5
Diabetic foot ulcer (months)	6	7
Investigations		
Hemoglobin (gm%)	12	11
Serum albumin (g/dl)	3.06	3.12

The data for categorical variables are given in numbers with percentages in brackets.

The comparison between the outcomes of povidone iodine dressing group and saline dressing group in terms of surface area reduction of wounds were made. The mean surface area of wound in povidone iodine group was: baseline- 12.2 sq.cm, 2nd week- 11.7 sq.cm, 4th week- 10.6 sq.cm, 6th week- 9.8 sq.cm; while in saline group was: baseline- 13.3 sq.cm, 2nd week- 11.6 sq.cm, 4th week- 10.8 sq.cm, 6th week- 9.6 sq.cm (Table 2).

After 6 weeks, the mean reduction in surface area of wound is more in the saline dressing group compared with the povidone iodine dressing group and the results are statistically significant at a $p < 0.05$.

None of our patients developed any reaction to povidone iodine, however few experienced a sort of local

discomfort immediately following dressing, which subsided without any treatment within minutes, while saline dressing group had no such complaints. None were excluded or lost to follow up during the course of study.

Table 2: Comparison between outcomes of povidone iodine dressing group and saline dressing group in terms of surface area reduction of wounds.

	Surface area in povidone iodine dressing group (sq.cm)	Surface area in saline dressing group (sq.cm)
Baseline assessment	12.2	13.3
After 2 weeks	11.7	11.6
After 4 weeks	10.6	10.8
After 6 weeks	9.8	9.6

DISCUSSION

The aim of wound dressing is to provide a relatively clean wound with low bacteria count that provides optimal environment for healing.⁷ The role of saline as a dressing material has been studied by many authors.⁸⁻¹⁰ Most of the studies involving saline dressing were conducted on different types of diabetic wounds show similar results as that of ours. DFUs have different characteristic in term of polymicrobial nature of infection, compromised tissue vascularity, loss of sensation and potentially deep seated infection.¹¹ Chronic DFUs usually take a longer time to heal and for this reason, the cost for the dressing may be an issue. Moisture retaining dressing materials which are available in the market are generally expensive. Therefore, the overall cost for wound dressing with saline is relatively cheaper and hence it does provide an economical and practical option for the management of DFUs.^{12,13}

In the western world, most wound clinics do not recommend the use of povidone iodine application on clean wounds.⁴⁻⁶ However, in India many physicians and nurses frequently use povidone iodine even in clean wounds. The present study demonstrates that the rate of wound healing with povidone iodine was slower than that achieved by the saline treated group

CONCLUSION

Saline dressing is more effective as compared to povidone iodine dressing in achieving complete healing, reducing wound surface area, and increasing comfort in subjects with chronic DFU. Furthermore, saline dressing is more cost-effective compared to povidone iodine dressing. Hence saline dressing is preferred over povidone iodine in chronic DFU dressing.

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