

Outcome of Negative Pressure Wound Therapy in Management of Large Wounds in Diabetic Patients

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ABSTRACT

Aim: To determine the outcome of negative pressure wound therapy in management of large wounds in diabetic patients.

Study design: Descriptive case series.

Setting: Surgical floor of Mayo Hospital, Lahore.

Duration: One year from 01-01-2012 to 31-12-2012.

Methods: This study included 82 diabetic patients with large wounds of both gender aged more than 12 years. The patients were managed with negative pressure wound therapy and observed for outcome in terms of disappearance of wound discharge, mean decrease in wound size, no bacterial growth and wound closure (yes/no).

Results: Disappearance of wound discharge was seen in 70(85%) patients at 6th week, mean decrease in wound size was $-15.45 \pm 10.10 \text{cm}^2$, no bacterial growth was seen in 42(51.2%) patients at 6th week, wound closure was seen in majority of patients 57(69.5%) by the end of 6th week.

Conclusions: Negative pressure wound therapy has a better outcome in healing large wounds of diabetic patients.

Keywords: Negative pressure wound therapy; diabetic patients; wounds

INTRODUCTION

Diabetes is rapidly growing worldwide and diabetic foot is becoming more common ⁽¹⁾. Wound complications are a major cause of admissions in those patients, and comprise a disproportionately high number of hospital days and economical burden on health care budget because of multiple surgical procedures and prolonged length of treatment¹.

Saline-moistened gauze has been the standard method; however, it has been difficult to continuously maintain a moist wound environment with these dressings. This has led to the development of various hydrocolloids wound gels, which provided more consistent moisture retention^{2,3}. Different ways of wound closure include primary closure, delayed primary closure and healing by secondary intention. Larger wounds are closed by skin grafting and flaps.

Negative pressure wound therapy (NPWT) is a newer non invasive adjunctive therapy that uses controlled negative pressure to help promote wound healing by removing fluid from open wounds through a sealed dressing and tubing which is connected to a collection container^{4,5,6}. The use of sub atmospheric pressure dressings, available commercially as a VAC (vacuum assisted closure) device, has been shown to be an effective way to accelerate healing of various wounds^{7,8}.

The role of negative pressure dressing in healing of large wounds of diabetic patients has been proposed as a novel method of manipulating the chronic wound environment in a way that it reduces bacterial burden and interstitial wound fluid, increasing vascularity and cytokine expression and to an extent mechanically exploiting the viscoelasticity of peri wound tissues^{1,9}.

Negative pressure wound therapy showed statistically a higher average daily rate of volume reduction (diameter and depth) of wound and proliferation of granulation tissue^{9,10,11,12}. It is not routinely used in our country and very limited data is currently available regarding its efficacy. Results of studies done in developed countries show markedly improved rates of wound healing in patients with Negative pressure wound therapy.

METHODOLOGY

This study was conducted on 82 patients admitted in surgical floor of Mayo Hospital, Lahore through OPD or emergency in a period from 01-01-2012 to 31-12-2012 (1 year). Study design was a descriptive case series and patient selection was non probability consecutive sampling. All patients of both gender aged more than 12 years, diagnosed diabetic according to standard American Diabetic Association Criteria having Ulcers ranging between 50cm^2 to 200cm^2 were included in the study. Patients with obvious sepsis, osteomyelitis, on corticosteroids,

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immunosuppressive drugs or chemotherapy and having pre-existing cardiovascular, pulmonary and immunological disease were not included in the study.

Demographics like name, age, gender and address were recorded. The patients were assessed clinically and relevant investigations like CBC, blood sugar, urea & creatinine, electrolytes etc, were done as per usual protocol. Informed consent was taken and initial sharp debridement to remove necrotic tissue and slough was done. After debridement, foam-based dressing with a suction drain tube embedded in the foam was done over the wounds under all aseptic conditions. The dressing was covered by adhesive drape (Opsite) to create air tight seal. The suction drain tube was then connected to suction machine and subatmospheric pressure in a range of -50 to -100mmHg was applied for every alternate hour. The dressings were changed as and when required. Wound discharge and wound size was observed daily and recorded. A weekly culture was sent from the base of ulcers to assess bacterial colonization. A standard broad spectrum antibiotic was given initially to all patients which later modified according to culture sensitivity report. An ulcer was treated until the wound got closed either surgically or spontaneously, or until completion of 6 weeks assessment whichever was earlier. Approximate time

for healing of the wound was calculated and recorded. SPSS version 17 was used to analyze data. Quantitative data like age and mean decrease in wound size was presented in the form of mean \pm S.D. Qualitative variables like gender, disappearance of wound discharge, no bacterial growth and wound closure (yes/no) was presented in the form of percentages.

RESULT

There were 82 patients included in this study. The mean age of the patients in study was 62.45 ± 6.63 years. There were 62 (76%) male patients and 20(24%) female patients with a ratio of 3.1:1. At the start of study wound discharge were present in all patients but by the end of 6th week only 12(15%) patients had wound discharge and 70(85%) had no any wound discharge (Fig. 1). At the end of 6th week with NPWT, mean decrease in wound size was $-15.45 \pm 10.10 \text{cm}^2$. By the end of 6th week culture of wound showed that 42(51.2%) patients had no growth (Fig. 2). Healing of the wound was so fast that majority of patients 57(69.5%) had their wound closed by the end of 6th week. Wound closure was either by delayed primary closure, secondary healing, skin grafting or flaps.

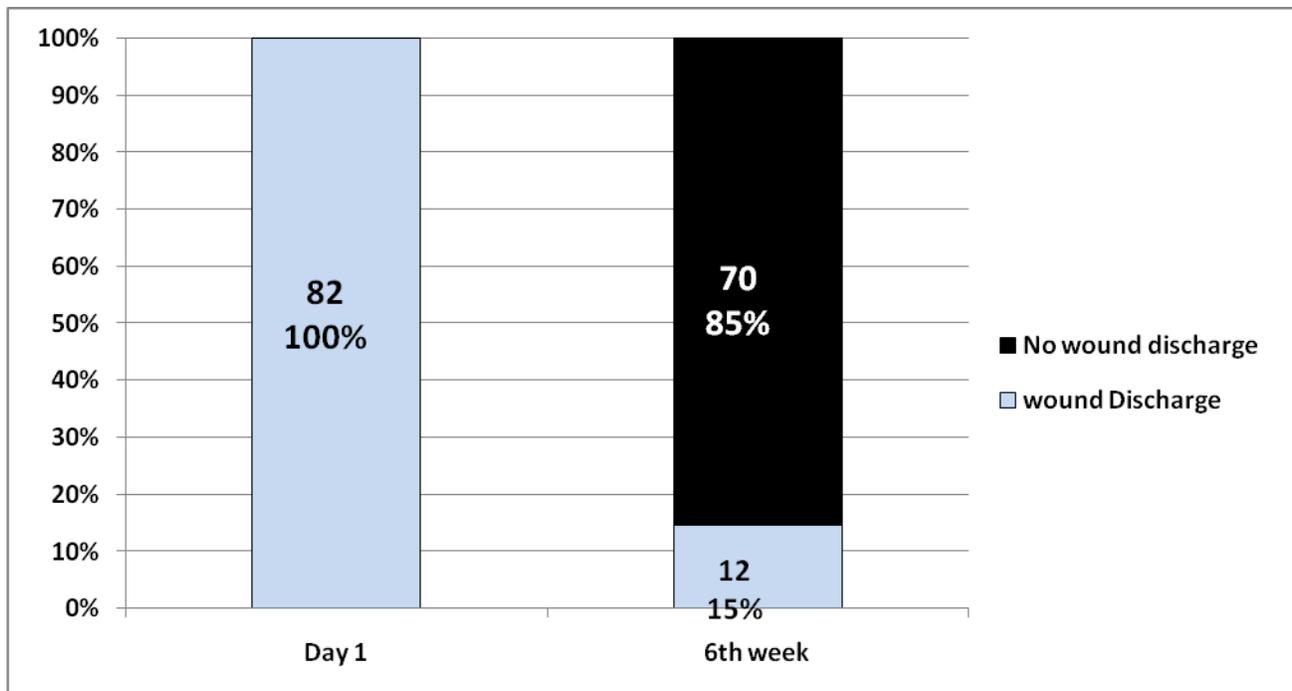


Fig.1: Wound discharge

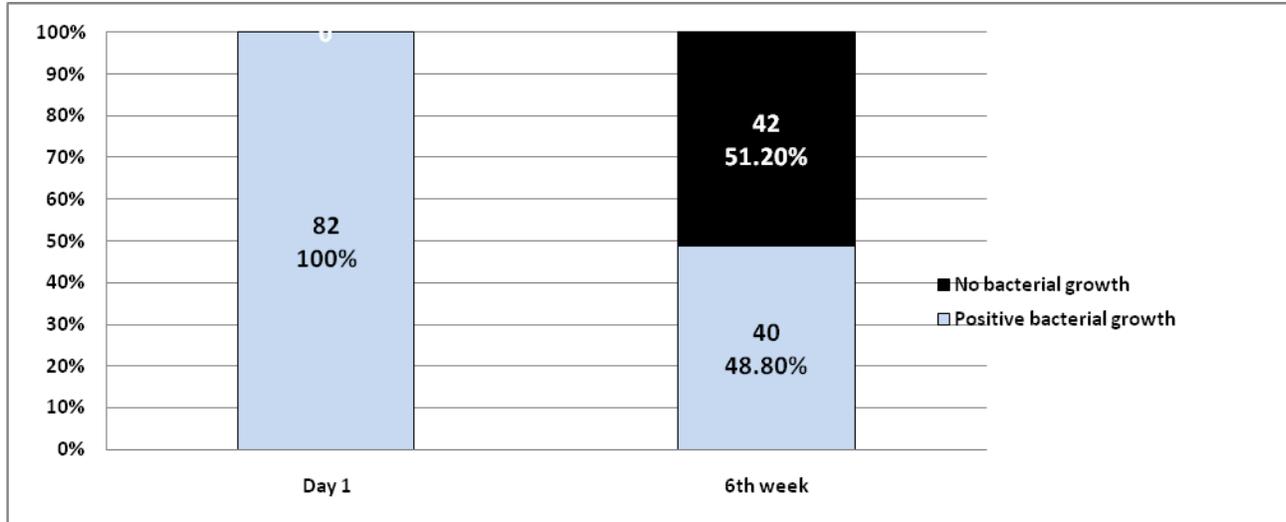


Fig. 2: Bacterial growth on culture.

DISCUSSION

Negative pressure wound therapy is becoming a mainstay of treatment of chronic wounds in diabetic patients as it reduces bacterial load and wound discharge from wound site thus manipulating the wound environment and promotes healing by increasing vascularity and vasodilation of arterioles. Therefore we carried out this study to find the impact of NPWT on rate of healing of chronic diabetic wounds.

Demographic profile was statistically studied and no significant difference was found in comparison to other studies. The mean age of study group was 62.45 ± 6.63 years which was comparable to the study conducted by Nain PS et al⁽¹⁾ on management of diabetic foot ulcers on 30 patients who had mean age of 61 years. The subatmospheric pressure applied in our study was in a range of -50 to -100mmHg which was comparable to Subatmospheric (negative) pressure applied by Nain PS et al¹ which was within a range of -50mmHg to -125mmHg.

Our study showed significant decrease in wound discharge, it was present only in 15 % of patients. Similar results was found in a study by Tamhankar et al¹³, on mesh related wound infections during hernia repair which were treated by negative pressure wound therapy. According to Nain PS et al¹, Wound discharge was present in only 13.33% of diabetic patients with ulcers in 7th and 8th week with negative pressure wound therapy which is comparable to our study.

There was a greater reduction in wound size in study group i.e., $-15.45 \pm 10.10 \text{cm}^2$ and no bacterial growth in 51.2% patient by the end of 6 week which was comparable to the study conducted by Nain PS et al¹ in which the mean decrease in the wound size

was $-16.14 \pm 13.04 \text{cm}^2$ and 40 % showed no bacterial growth after 3 weeks of treatment. In our study wound healing was fast as shown by complete closure in 69.5% of patients by the end of 6th week which was comparable to a study by Antony S et al⁷ on management of spinal wound in which all patients had complete healing within 8 weeks of active treatment and Blume et al¹⁰ on management of diabetic foot in which patient had complete healing in 43.2% within 112 days of active treatment.

CONCLUSION

We conclude that negative pressure wound therapy have a definitive role in healing chronic diabetic wounds in terms of disappearance of wound discharge, mean decrease in wound size, no bacterial growth and wound closure. Negative pressure wound therapy promised early and complete wound healing in shorter duration of time and thus finally decrease the suffering of patient, hospital stay and financial burden on health care budget.

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