COMPARING NEGATIVE PRESSURE WOUND TREATMENT WITH HONEY DRESSING IN HEALING OF FOOT ULCERS IN DIABETICS

Umar Bashir, Rasikh Maqsood, Hassan Shabbir,

Combined Military Hospital Multan/ National University of Medical Sciences (NUMS) Pakistan

ABSTRACT

Objective: To evaluate and compare the effectiveness of vacuum assisted treatment with that of honey dressing in duration of healing of foot ulcers in diabetics.

Study Design: Randomized control study.

Place and Duration of Study: Combined Military Hospital Multan & Nishtar Hospital Multan, from Aug 2016 till Feb 2017.

Patients and Methods: A total of 95 patients with ages between 30-60 years of both sexes, who presented with diabetic ulcers of foot involving subcutaneous tissue& skin. Patients were divided randomly into two groups; Group V and H. Group V was subjected to Vacuum Pack closure (negative pressure wound treatment) and group H was treated with honey dressing, follow up was done till the appearance of healthy tissue after initial debridement, suitable for STSG (Split Thickness Skin Graft) or primary closure.

Results: Healthy tissue appeared much faster in Vacuum assisted treatment, then with honey dressing with mean of 18.2 days for V.A.C and 28.8 days for honey dressing.

Conclusion: Vacuum assisted closure was more effective in the treatment of foot ulcers in diabetics. It promotes healthy granulation tissue in the wound bed at a faster rate in comparison to honey dressing.

Keywords: Vacuum Assisted Closure (V.A.C), Honey dressing Negative pressure wound treatment, Diabetic foot, and Occlusive dressings.

INTRODUCTION

Foot ulcers in diabetes, are the most common reasons for below knee amputations accounting for 50-70% of non-traumatic lower limb amputations. Ulcers of the foot affect 10-25% of diabetic patients[1-3]. Treating foot ulcer in diabetics is often a daunting task. Wound dressing haspivotal role in treatment of foot ulcers in diabetics. Over the years several advancements have been made in wound care and new products are developed. There are various management modalities for foot ulcers in diabetics.Apart from good glycemic control, dressing plays an important part in wound healing. Moist wound dressing[4,5], honey dressing, tissue which are bioengineered or substitutes of the skin[6,7] growth factors[8,9]. Low voltage stimulation[10], laser therapy and negative pressure wound therapy (NPWT) all are applied with the goal of achieving healthy granulation tissue and wound treatment. In particular, negative pressure wound therapy (NPWT) using the Vacuum Assisted Closure (V.A.C) Therapy System has been used with good results. It functions by localised negative sub atmospheric pressure environment in which it applies both mechanical and biological factors for the wound in which to heal[11]. Microstatins and macrostatins factors which include drawing wound edges together with complete wound bed contact, removing exudates from the wound, promoting perfusion, cellular proliferation, migration, granulation and angiogenesis are much of the reasons for its successin healing[12-14].

Honey has been used for the treatment of various wounds since ancient times because of its antimicrobial properties. Factors contributing

Correspondence: Dr Rasikh Maqsood, Department of Surgical, Combined Military Hospital Rawalpindi Pakistan
Email: rasikh2000@yahoo.com
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to honey's antimicrobial properties are high viscosity, hydrogen peroxide, methylglyoxal (MGO), the antimicrobial peptide bee defensin-1 and mean pH[4,15]. The reduced pH increases release of oxygen from hemoglobin thereby making the wound environment less favorable for the proteases to act[15]. The interest in natural biological dressings has been on the rise due to increase use of antibiotic, which has led our communities and overall the general population antibiotic resistance. Honey with all its beneficial properties and easy availability is a proficient biological dressing, with particular interest is the antibiotic and antiviral effects. Evidence from studies done on animals and few trials has suggested that honey accelerate the process of wound healing.

Outcome of wound closure varies in studies and there is derth of local data which could compare the outcome of the tow techniques.

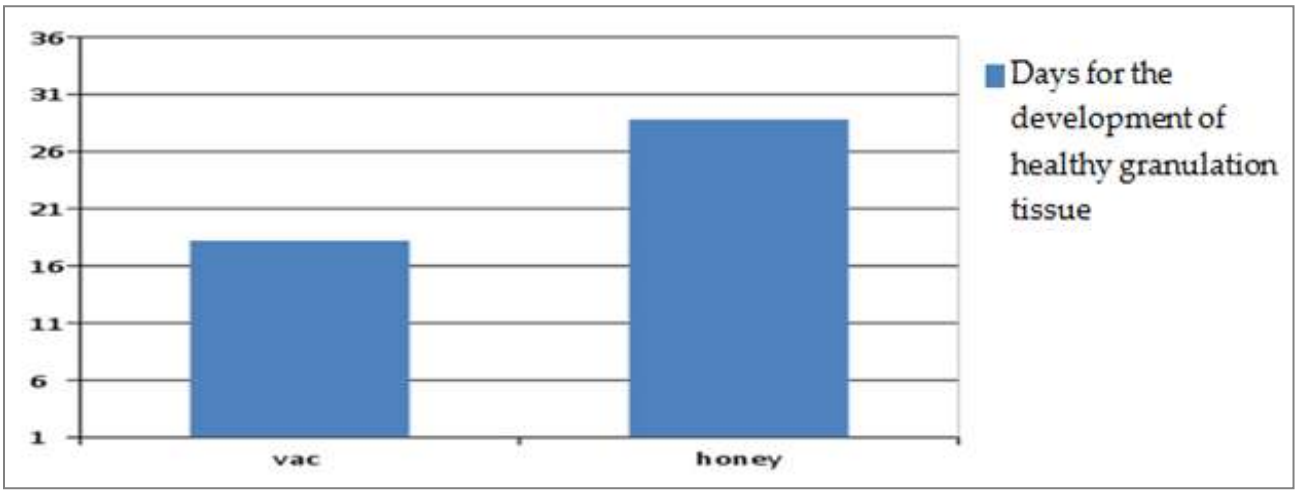

Figure: Days for the development of healthy granulation tissue.

METHODOLOGY

In the study a total of 107 were initially enrolled with 4 patients lost to follow up, 2 patients grew antibiotic resistant organisms so were not followed but treated differently and 6 patients needed a second or third debridement. Thus 95 patients remained, were followed and completed the study. A multicenter trial was carried out during the period of 6 months from August 2016 till February 2017. All the patients were explained in detail about the study design and written consent was taken.

The sample size was calculated using Raosoft sample size calculator, keeping the confidence level of 95% with an error margin of 5% and population size of 100 keeping response distribution 50%, sample size was n=80. Total of 95 patients were followed all between the ages of 30-60 years with diabetic foot ulcer. Only Wagner scale grade 1 or 2 diabetic ulcers were enrolled.

Exclusion criteria were patient with Wagner grade 3 to 5, uncontrolled diabetes i.e. HbA1c >7%, hemoglobin <8 g/dl, more the one ulcer, patients needing a second or a third debridement, pregnant and nursing mothers. Total of 95 patients with Wagner's grade 1 and 2 ulcers met inclusion criteria. Patients were divided into two groups V (n=51) and H (n=44). Patients were randomized into either group on the basis of treatment assigned envelopes handpicked by patients. Patients were admitted in the in-patient department for the first debridement. Initial cultures were sent, a single dose of pre-operative IV third generation cephalosporin was given wound was washed, debrided, homeostasis secured and dressing applied according to either group criteria. Post-operatively patients were given two doses of enteral similar antibiotic.

Patients were kept in the in-patient department for three days till the first dressing change.

Group V patients underwent V.A.C therapy. A V.A.C was made by placing a saline soaked sponge over the wound and a dry sponge above it with a 14 size drain in the middle. An Op-site was used to cover the wound, created an air-tight seal and the drain produced through it. The drain was attached to the suction machine; a suction of 125 mmHg was then applied. The V.A.C was checked for any leakage.

Group H patient were the ones whose wounds were dressed with Honey. Sterilized Honey was daubed over the wound, dry sponge placed over the wound and bandaged.

Wound size was measured by using a measuring tape in centimeters in two dimensions length and width.

Patients were discharged after the first dressing and educated regarding dressings, how to take care of them and how to work the suction machines. Patients were advised to buy a portable suction machine and those who couldn't afford the machines were kept in the in-patient department.

Wound size measurement were done every sixth day on the second follow up. Wound size ranges from 6 x 2 cm to 15 x 7cm. Dressing were changed every third day and patients were assessed if they needed a second debridement. Four patients required a second debridement and

Table-I: Gender Distribution.

Group	V	H
male	32	28
Female	19	16

Table-II: Wound healing in days in Group V.

Days	Frequency
12	10
14	12
16	9
18	6
21	5
23	5
24	4
Total	51

Table-III: Wound healing in days in Group H.

Days	Frequency
23	4
24	3
26	4
27	5
28	1
29	3
30	8
31	3
32	5
33	6
34	2
Total	44

two patients required a third debridement so were excluded from the study.

Patient were followed until the wound developed healthy granulation tissue without any discharge and with no growth on the final culture. Those patients were than referred to either Plastic Surgery for a skin graft or their wounds closed secondarily. The information collected was entered and analysed using SPSS version 20.

RESULTS

Total of 107 patients with diabetic foot ulcer were randomly assigned into one of the two groups i.e., V and H. Only 95 patients completed the study. Group V patients (n=51) were subjected to VAC and group H patients (n=44) were subjected to honey dressing as per the pre-defined criteria for healing. Mean age of patients in group V and H was 48.5 and 51 years respectively.

Total number of male (63.1%) in group V and H were 32 & 30 respectively where as the number of females (36.8%) in each group was 19 & 16 respectively (table-I).

The maximum size of the wound in groupv was 19 cm^2 (calculated as height × width =cm^2) and in group H was 23 cm^2. Majority of the ulcers in each groupranged in size between 11 & 16 cm^2 with mean of 13.5 cm^2.

Number of days for the development of healthy granulation tissue in group V was mean 18.2 days and group H was mean 28.8 days (table-II & III).

DISCUSSION

The pursuit of the study was to analyze & compare the negative pressure wound treatment (V.A.C) with honey dressing in diabetics ulcer patents. The study showed a remarkably faster healing time with the appearance of healthy granulation tissue in V.A.C dressing.

Not much data is available when comparing V.A.C with honey dressing. But many studies have proven again and again on the benefits of V.A.C as well as honey dressings. When comparing NPWT, a randomized control trial by Armstrong et al compared NPWT with moist gauze in diabetic foot amputees and showed a faster degree of healing as well as a faster time to granulation tissue formation[16]. Similar results were achieved with a study by McCallon et al, comparing NPWT with saline dressing in diabetic with foot ulcers[8].

In a study carried out by Fakoor et al. to see the effects of honey on compound fracture wounds concluded that favorable wound closure was obtained with small wounds (15 x 2cm) with complete closure after 2 months[17].

Our Study didn't follow the patients until complete healing but just until the granulation tissue appearance because complete healing can take months and resources are scant for such endeavors.

There has been no doubt that both the dressing have huge benefits in diabetic foot ulcer healing. But according to our study V.A.C has proven to be more profecient to honey dressing. Multiple reasons may have attributed to these results. The Average Group H patient had a bigger average wound size which might have displayed a result bias if we were following patient till complete healing and wound retraction. Some of the Group V (V.A.C) patients were kept in the hospital whilst all the Group H (Honey Dressing) were sent home after the first dressing. Hospital care which might have improved their glycemic control as well as take care of the V.A.C suction machine issues might have played some role in early healing in V.A.C patients. Our study included patients with Wagner's grade 1-2 and there is no dispute that patients in Pakistan mostly come to in-patient facilities when wounds are primarily at grade 3 or grade 4. Patients with grade 3-4 need substantial and multiple debridement and thus a very long follow up which was not feasible for the study at this time.

CONCLUSION

To conclude, in our opinion every patient's needs, requirement and suitability should be kept

in mind when suggesting a treatment. For some patients Honey dressing may work wonders and for some V.A.C may prove to be more beneficial. Keeping all that in mind Negative Pressure Wound Therapy may have some advantages over honey dressing.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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