

ORIGINAL ARTICLE

EFFICACY OF VACUUM ASSISTED CLOSURE DRESSINGS WHEN COMPARED TO MOIST WOUND DRESSINGS IN THE MANAGEMENT OF DIABETIC FOOT ULCERS: A PROSPECTIVE COMPARATIVE STUDY

Ballapalli Hari Prasad¹, Mahidhar Reddy Venkatapuram², Sreeram Satish³

HOW TO CITE THIS ARTICLE:

Ballapalli Hari Prasad, Mahidhar Reddy Venkatapuram, Sreeram Satish. "Efficacy of Vacuum Assisted Closure Dressings when Compared to Moist Wound Dressings in the Management of Diabetic Foot Ulcers: A Prospective Comparative Study". Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 43, October 26, 2015; Page: 7662-7666, DOI: 10.18410/jebmh/2015/1035

ABSTRACT: INTRODUCTION: Foot ulceration is mainly responsible for the morbidity of diabetes mellitus. They deprive the patient of quality working days and add to his financial burden. Several novel methods of wound healing came to vogue among which vacuum assisted dressing is becoming quite popular. Present study aims to evaluate its efficacy when compared to regular moist wound dressings. **OBJECTIVES:** To study the effectiveness of vacuum assisted dressings in terms of Rate of wound healing. **MATERIALS AND METHODS:** we carried out a prospective study at Narayana medical college hospital on two groups (group A and group B) of diabetic foot ulcer patients, whom we selected randomly after considering inclusion and exclusion criteria. Vacuum assisted dressings were done in group A patients and normal moist wound dressings in group B. At the start of the treatment and every week thereafter, size and depth of ulcers were recorded and results were compared at complete wound healing or at the end of 12 weeks of treatment whichever is earlier. Strict glycaemic control was maintained throughout the treatment period. **RESULTS:** significant healing was noticed in group A patients (vacuum assisted dressings group) both in terms of ulcer size and depth. Wounds appeared more-healthy i.e. with less slough and more red granulation tissue in group A patients. **CONCLUSION:** vacuum assisted dressing is an efficacious method in the treatment of diabetic foot ulcers with significantly reduced hospital stay.

KEYWORDS: vacuum assisted dressing, Diabetes Mellitus, foot Ulcers.

INTRODUCTION: Diabetic foot ulcers are because of angiopathy and neuropathy produced by the disease and gets aggravated by poor glycaemic control and secondary infections. angiopathy decreases blood supply to the foot and neuropathy -sensory, motor and autonomic precipitate ulcer formation by means of decreased sensation, altered foot arch mechanism and dryness of skin respectively. Diabetic foot ulcers respond poorly to conventional moist wound dressings thus increasing length of hospital stay depriving the patient of quality working days, increasing hospital expenses and increasing morbidity. Vacuum assisted dressings are shown to enhance wound healing by suctioning out slough,⁽¹⁾ debris and exudates from the wound continuously and also by enabling wound contracture from all sides and depth in several studies conducted previously.⁽²⁾⁽³⁾ We have done this randomized prospective study to concur the above view.

ORIGINAL ARTICLE

MATERIALS AND METHODS: we conducted this study at general surgery department, Narayana Medical College and Hospital, Nellore during the period June 2014 to July 2015. Patients were selected among the consecutive admissions going on in the general surgery department. Patients with diabetic foot ulcers were included in the study. Patients with debilitating comorbidities like chronic renal failure, cirrhosis of liver, advanced cancers, coronary artery disease, severe malnutrition, peripheral vascular disease etc. were excluded from the study. About 100 patients were selected and by simple randomization they were assigned to two groups 50 each. Vacuum assisted dressings were done to group A patients and moist wound dressings were done to group B patients. Strict glycaemic control was achieved in both the groups before start of treatment and also during treatment. Also weekly pus culture and sensitivity samples were taken from the wounds in both groups and antibiotics were given based on sensitivity. Underlying anaemia, hypoproteinaemia were corrected in all patients for vacuum assisted dressings the wound was covered with sponge wedges over which tubings placed which are connected to a suction apparatus ⁽⁴⁾⁽⁵⁾ which can generate a negative pressure of 100 to 120mmhg.⁽⁶⁾ The entire wound-sponge-tubing was draped with an ioban cover to isolate and lock it airtight.⁽⁷⁾ Before the start of the treatment and once in a week thereafter, depth and size of the wounds were recorded. The recordings were carried for a period of 12 weeks or till the healing of ulcer whichever is earlier. Vernier calipers were used to measure ulcer depth and ulcer area was calculated for the average diameter. All patients participating in the study were informed and their consent taken approval for study was obtained from ethics committee.

STATISTICAL ANALYSIS: SPSS latest version 2015 was used to analyze numerical data and expressed as mean+/-standard deviation (SD). Ulcer area was calculated along average diameter and ulcer depth measured by vernier calipers. Both readings were compared between the two groups before and after treatment. P value less than 0.05 was considered statistically significant.

RESULTS: Results were analyzed between group A (vacuum assisted dressings) and group B (moist dressings). Maximum frequency of diabetic foot ulcers were seen in male patients. Most common site of ulcer was right forefoot over ball of great toe. It was type 2 diabetes which was more common in both males and females.⁽⁸⁾ The average age of diabetic foot presentation was 48years in males and 57 years in females. Demographics of the study are tabulated below.

	Vacuum assisted dressing group count	Vacuum assisted dressing group percent	Moist dressing group count	Moist dressing group percent
1. a. male	31	62%	33	66%
b. female	19	38%	17	34%
2. Type 1 diabetes	2	4%	1	2%
Type 2 diabetes	48	96%	49	98%
3. Right foot	35	70%	29	58%
Left foot	15	30%	21	42%

ORIGINAL ARTICLE

4. Average size of ulcer	5.3cm ²		5.5cm ²	
5. Average depth of ulcer	7mm		6.8mm	

Table 1

Before start of treatment the average size of the ulcer was 5.3cm² in vacuum assisted dressing group and it was 5.5cm² in saline group. After treatment it was 1.7cm² and 4.1cm² respectively. There was statistically significant difference between the two groups ($p < 0.05$) in the improvement of ulcer area wise after treatment.

Size of ulcer	Vacuum assisted dressing group	Moist dressing group
Before treatment	5.3 cm ²	5.5 cm ²
After treatment	1.7cm ²	4.1cm ²

Table 2

The average depth of ulcer in vacuum assisted dressing group was 7mm before start of treatment whereas it was 6.8mm in moist dressing group. After treatment it was 2.6mm and 5.2mm respectively. There was statistically significant difference between the two groups ($p < 0.05$) in the improvement of ulcer depth wise after treatment.

Depth of ulcer	Vacuum assisted dressing group	Moist dressing group
Before treatment	7mm	6.8mm
After treatment	2.6mm	5.2mm

Table 3

DISCUSSION: Diabetic foot ulcers by virtue of their poor healing nature become chronic and add lot of morbidity to the disease.⁽⁹⁾⁽¹⁰⁾ They deprive the patient from early return to work thus bringing financial loss to the patient. Several new methods of wound care like vacuum assisted dressings, topical insulin therapy, low voltage electrical stimulation, hyperbaric therapy etc.⁽¹¹⁾ Have come into vogue. Among these vacuum assisted dressings are easy to do at low cost. Its efficacy was established in several studies conducted earlier at different centers.⁽¹²⁾⁽¹³⁾ Our study also concurred with their results. We observed a statistically significant difference in the improvement of ulcer area wise and depth wise in the patients treated with vacuum assisted dressings when compared to moist wound dressings.

CONCLUSION: It appears that vacuum assisted dressings are an effective method in the management of diabetic foot ulcers and they significantly reduce hospital stay.

REFERENCES:

1. Mc Callon SK, Knight CA, Valiulus JP, Cunningham MW, McCulloch JM, Farinas LP. Vacuum-assisted closure versus saline-moistened gauze in the healing of postoperative diabetic foot wounds. *Ostomy Wound Manage.* 2000; 46: 28–32. 34.
2. Eginton MT, Brown KR, Seabrook GR, Towne JB, Cambria RA. A prospective randomized evaluation of negative-pressure wound dressings for diabetic foot wounds. *Ann Vasc Surg.* 2003; 17: 645–9.
3. Blume PA, Walters J, Payne W, Ayala J, Lantis J, Blume PA, et al. Comparison of negative pressure wound therapy using vacuum-assisted closure with advanced moist wound therapy in the treatment of diabetic foot ulcers: A multicenter randomized controlled trial. *Diabetes Care.* 2008; 31: 631–6.
4. Veves A, Falanga V, Armstrong DA, Sabolinski ML. Graftskin, a human skin equivalent, is effective in the management of noninfected neuropathic diabetic foot ulcers: A prospective randomized multicenter clinical trial. *Diabetes Care.* 2001; 24: 2001–295.
5. Robson MC, Payne WG, Garner WL, Biundo J, Giacalone VF, Cooper DM, et al. Integrating the results of phase IV (postmarketing) clinical trial with four previous trials reinforces the position that regranex (becaplermin) gel 0.01% is an effective adjunct to the treatment of diabetic foot ulcers. *J Appl Res.* 2005; 5: 35–45.
6. Mulder G, Armstrong D, Seaman S. Standard, appropriate, and advanced care and medical-legal considerations: Part one-diabetic foot ulcerations. *Wounds.* 2003; 15: 92–106.
7. Glenview, IL: Wound Ostomy and Continence Nurses Society; 2002. Guideline for Management of Wounds in Patients with Lower-Extremity Arterial Disease.
8. Martson WA, Hanft J, Norwood P, Pollak R. The efficacy and safety of dermagraft in improving the healing of chronic diabetic foot ulcers: Results of prospective randomized trial. *Diabetes Care.* 2003; 26: 1701–5.
9. Mahidhar Reddy Venkatapuram, Ashika Reddy Padamati, Rishita M. "A Study of Efficacy of Topical Insulin Therapy in the Treatment of Chronic Diabetic Foot Ulcer". *Journal of Evolution of Medical and Dental Sciences* 2015; Vol. 4, Issue 68, August 24; Page: 11820-11823, DOI: 10.14260/jemds/2015/1704
10. Jacobs S, Simhaee DA, Marsano A, Fomovsky CM, Niedt G, Wu JK. Efficacy and mechanisms of vacuum-assisted closure (VAC) therapy in promoting wound healing: a rodent model. *J Plast Reconstr Aesthet Surg.* 2009; 62(10): 1331-1338.
11. McNulty A, Spranger I, Courage J, Green J, Wilkes R, Rycerz A. The consistent delivery of negative pressure to wounds using reticulated, open cell foam and regulated pressure feedback. *Wounds.* 2010; 22(5):114-120.
12. Orgill DP, Bayer L RC. Update on negative-pressure wound therapy. *Plast Reconstr Surg.* 2011; 127(Suppl. 1): 105S-115S.
13. Fogg E. Best treatment of nonhealing and problematic wounds. *JAAPA.* 2009; 22(8): 46-48.

ORIGINAL ARTICLE

AUTHORS:

1. Ballapalli Hari Prasad
2. Mahidhar Reddy Venkatapuram
3. Sreeram Satish

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of General Surgery, Narayana Medical College.
2. Associate Professor, Department of General Surgery, Narayana Medical College.
3. Professor & HOD, Department of General Surgery, Narayana Medical College.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Ballapalli Hari Prasad,
Assistant Professor,
Department of General Surgery,
Narayana Medical College,
Chintha Reddy Palem,
Nellore, Andhra Pradesh.
E-mail: mdevishetty@gmail.com

Date of Submission: 15/10/2015.
Date of Peer Review: 16/10/2015.
Date of Acceptance: 19/10/2015.
Date of Publishing: 21/10/2015.