

## ORIGINAL RESEARCH

### Comparative study of vacuum assisted closure v/s conventional dressings in wound healing

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#### ABSTRACT:

**Background:**Chronic wounds result in significant functional impairment, reduction in quality of life, and large financial costs for patients and the health care system. This study intends to establish the efficacy of VAC in comparison with conventional dressings in wound healing.

**Materials & Methods:** 65 wound patients of both genders were allocated to VAC and conventional dressings, considering their diabetic and chronic conditions alternatively. All patients underwent detailed clinical examination and relevant investigations and the wounds were thoroughly debrided and the ulcer dimensions as well as the surface area assessed.

**Results:** There were 32 patients in group I and 33 in group II. Maximum patients (40.6%) in conventional dressing and (30.4%) in VAC dressing was seen in age group 51-60 years. Out of 65 patients 12 were females and 53 patients were males. Out of 12 females 8 underwent conventional dressings and 4 underwent vac dressings. Out of 53 male patient 24 underwent conventional dressings and 29 underwent VAC dressings. There was no statistically significant difference in gender distribution in both methods of dressings. Diabetic wounds were 25 each and chronic wounds were 3 in conventional and 4 with VAC method. Accident induced traumatic wounds were 4 each in both methods. The mean appearance of granulation tissue was 55.2% and 83.3%, wound contractures in millimetre<sup>2</sup> was 46.1 and 97.4 and duration of hospital stay was 16 and 8.76 in conventional and VAC group. The difference was significant (P< 0.05).

**Conclusion:** VAC dressing was superior to conventional dressing. As majority of our patients were diabetic, VAC dressings facilitated early wound healing and decreased the morbidity in our patients.

**Key words:** conventional dressing, VAC dressing, Wound

#### INTRODUCTION

Wounds which are showing characters of delayed healing or non- healing is a problem which gives rise to various complications.<sup>1</sup> Regardless of etiology, wounds are difficult to treat if coexisting factors such as infection or diabetes mellitus prevent regular wound healing.<sup>2,3</sup> Wounds represent a significant risk factor for hospitalization, psychological burden, amputation, sepsis, and even death, and from the patient's perspective, wound therapy is often

uncomfortable or painful. Chronic wounds result in significant functional impairment, reduction in quality of life, and large financial costs for patients and the health care system.<sup>4,5</sup> Chronic wounds are frequent problem in developing countries and affects at least 1% of the population and poses a heavy burden on both the patient and the service provider. Diabetes mellitus is the commonest cause especially in developing countries.<sup>6</sup> It is estimated that in the year 2014, around 422 million people worldwide were suffering from diabetes mellitus (WHO). The lifetime risk of developing limb ulcers mainly in the foot, among diabetics has been estimated to be 15%.<sup>7</sup>

Although wound dressing have been used for thousands of years, there exists no ideal dressing.<sup>8</sup> Surgical dressing of both open and closed wounds is based mainly on tradition, training and the surgeons own philosophy.<sup>9</sup> Modern wound-healing concepts include different types of moist dressings and topical agents, although only a few of these treatments have convincingly been shown to give higher wound closure rates compared with traditional wet gauze dressings. During the last two decades a wide variety of innovative dressing have been introduced.<sup>10</sup> Negative pressure wound dressing is a new technology that has been shown to accelerate granulation tissue growth and promote faster healing, thereby decreasing the period between debridement and definite surgical closure in large wounds.<sup>11</sup> Vacuum assisted closure (VAC) provides a new paradigm for wound dressing and is a wound management technique that exposes wound bed to controlled negative pressure by a way of closed system. It provides an ideal environment which is necessary for wound healing.<sup>12</sup> Hence, this study intends to establish the efficacy of VAC in comparison with conventional dressings in wound healing.

## MATERIALS & METHODS

The present study comprised of 60 patients of both genders having wounds induced by diabetes, chronic infection or trauma.

The study was conducted at Anugrah Narayan Magadh Medical College, Gaya, Bihar, India. After obtaining clearance from ethical committee, patients were allocated to VAC and conventional dressings, considering their diabetic and chronic conditions alternatively; after explaining the options of treatment and taking their written informed consent. The selected patients were subjected to a detailed history elicitation including evaluation of risk factors, followed by clinical examination. They will then be subjected to HB%, TC, DC, ESR, BT, CT, HIV, HBsAg, blood grouping, HbA1C, RBS, FBS, PPBS, Blood urea, Serum creatinine and Urine routine-microscopy.

All patients underwent detailed clinical examination and relevant investigations and the wounds were thoroughly debrided and the ulcer dimensions as well as the surface area assessed. Before the start of VAC therapy, after initial debridement, the wound was photographed. Before surgical intervention at the end of VAC therapy, the final appearance of the wound was again noted and recorded. The patients were followed up on a daily basis in both test and control groups. The control group was subjected to dressings by conventional methods whereas the test group was subjected to topical negative pressure dressings and was left undisturbed for 3 days. Results were assessed statistically. P value less than 0.05 was considered significant.

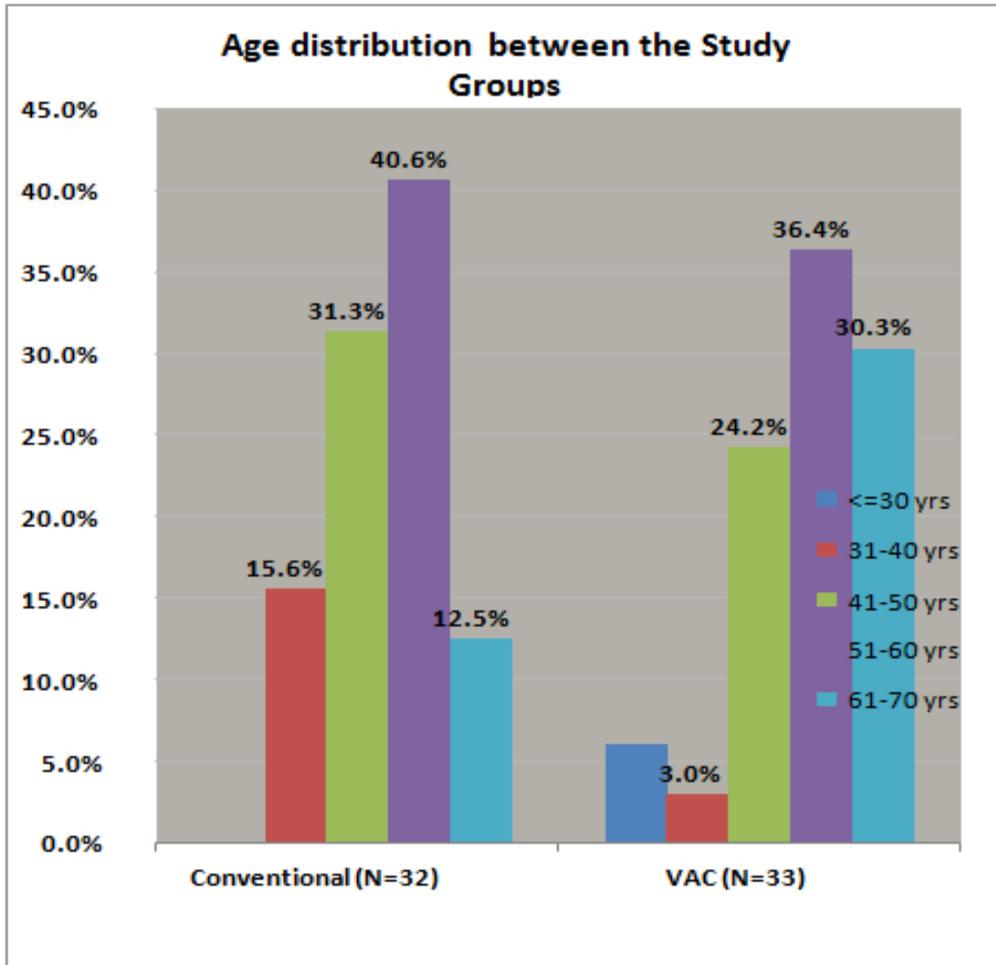
## RESULTS

**Table I Distribution of methods of dressing**

Dressing	Frequency	Percentage
Conventional	32	49.2
VAC	33	50.8
Total	65	100

Table I shows that there were 32 patients in group I and 33 in group II.

**Graph I Age distribution**



Graph I shows that maximum patients (40.6%) in conventional dressing and (30.4%) in VAC dressing was seen in age group 51-60 years.

**Table II Gender distribution**

Method	Gender		Total	X2 value	P value
	Male	Female			
Conventional	24	8	32	1.790	0.181
	75.0%	25.0%	100.0%		
VAC	29	4	33		
	87.9%	12.1%	100.0%		
Total	53	12	65		
	81.5%	18.5%	100.0%		

Table II shows that out of 65 patients 12 were females and 53 patients were males. Out of 12 females 8 underwent conventional dressings and 4 underwent vac dressings. Out of 53 male patient 24 underwent conventional dressings and 29 underwent VAC dressings. There was no statistically significant difference in gender distribution in both methods of dressings.

**Table III Type of wound in both methods of dressings**

Method	Type of wounds			Total	X	P
	Diabetic	Chronic	Trauma			
Conventional	25	3	4	32	0.128	0.721
VAC	25	4	4	33		
Total	50	7	7	65		

Table III shows that diabetic wounds were 25 each and chronic wounds were 3 in conventional and 4 with VAC method. Accident induced traumatic wounds were 4 each in both methods.

**Table IV Comparison of parameters**

Method	Conventional	VAC	P value
Appearance of granulation tissue	55.2	83.3	0.04
Wound contractures in millimetre <sup>2</sup>	46.1	97.4	0.02
Duration of hospital stay	16	8.76	0.05

Table IV shows that mean appearance of granulation tissue was 55.2% and 83.3%, wound contractures in millimetre<sup>2</sup> was 46.1 and 97.4 and duration of hospital stay was 16 and 8.76 in conventional and VAC group. The difference was significant ( $P < 0.05$ ).

## DISCUSSION

In this study it is demonstrated that the use of vacuum therapy in wounds results in improved wound healing compared to conventional moist gauze therapy.<sup>13</sup> This is reflected by on average healthier wound conditions i.e. faster healing, rapid appearance of granulation and decreased hospital stay. One of the important advantages of vacuum therapy is the fact that healthier wound conditions were achieved without intermediate debridement.<sup>14</sup> In most of the conventionally treated patients, debridement was necessary to remove slough. Correction of anemia done using hematinics and blood transfusion whenever necessary.<sup>15</sup> Appropriate antibiotics used after empirical therapy after considering culture and sensitivity. Diffuse atherosclerosis noted in 49 patients. Glycaemic control achieved using regular insulin if needed along acting insulin (basalog) also added.<sup>16</sup>

In our study granulation tissue appeared at the end of the six days of therapy 83.3% in VAC therapy and in conventional therapy it was 55.2%. Our study is comparable in appearance of granulation tissue. Also comparable to Joseph et al<sup>17</sup> in which granulation tissue appearance was 81.5% in VAC therapy vs 54.3% in conventional dressings. It is also comparable to Abidli et al<sup>18</sup> in which appearance of granulation tissue in was 79.4% in VAC therapy and 55.38% in conventional therapy.

Hospital stay in our study was average of 8.76 days for VAC dressings and for conventional dressings it was 16 days, skin grafting was done. There is significant reduction in hospital stay in VAC dressings compared to conventional dressing owing to decreased antibiotic use, need for lesser number of dressings and good quality wound for skin grafting.

Our study is comparable with Atef Bayoumi et al<sup>19</sup> in terms of wound contracture at end of one week of VAC dressings. Average size of wound in our study was 94.58 cm<sup>2</sup> and 106.5 cm<sup>2</sup> VAC and conventional groups respectively. Contracture of wound for VAC dressings was 10.3% and 4.3% in conventional dressings in our study, compared to Atef Bayoumi et al<sup>19</sup> in which wound contracture was 10.76% and 2.05% with the initial size of wound.

Peter A Blume et al<sup>20</sup> conducted a study to evaluate safety and clinical efficacy of negative pressure wound therapy (NPWT) compared with advanced moist wound therapy (AMWT) to treat foot ulcers in diabetic patients. It was multicentre randomized controlled trial in which

342 patients with a mean age of 58 years were enrolled 79% were male. Patients whose wounds achieved ulcer closure were followed at 3 and 9 months. Results of the study showed that a greater proportion of foot ulcers achieved complete ulcer closure with NPWT (73 of 169, 43.2%) than with AMWT (48 of 166, 28.9%) within the 112-day active treatment phase ( $P < 0.007$ ). The Kaplan-Meier median estimate for 100% ulcer closure was 96 days (95% CI 75.0–114.0) for NPWT and not determinable for AMWT ( $P < 0.001$ ). NPWT patients experienced significantly ( $P = 0.035$ ) fewer secondary amputations. The proportion of home care therapy days to total therapy days for NPWT was 9,471 of 10,579 (89.5%) and 12,210 of 12,810 (95.3%) for AMWT. In assessing safety, no significant difference between the groups was observed in treatment-related complications such as infection, cellulitis, and osteomyelitis at 6 months. Study concluded that NPWT appears to be a safe and more efficacious than AMWT for the treatment of diabetic foot ulcers.

## CONCLUSION

We found that VAC dressing was superior to conventional dressing. As majority of our patients were diabetic, VAC dressings facilitated early wound healing and decreased the morbidity in our patients.

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