

## The Role of Negative Pressure Dressing in Wound Management in Comparison With Conventional Dressing

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**Abstract :** Delayed wound healing affects quality of life and increasing hospital stay. Not just the pain and suffering, a chronic wound becomes a disability, imposing social and financial burden. The negative pressure dressing which is an alternate for standard dressing could improve and fasten healing. The negative pressure dressing aids and hastens wound healing, by various means thereby bringing down the morbidity produced by wounds. It can act as a bridge between definitive procedure, by bringing down the transit time. It has been approved by Food and Drug Administration(FDA) for the treatment of non-healing wounds since 1997.

**Keywords:** Wound healing, Negative pressure dressing,

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### I. Introduction

Management of wounds is an art as old as humanity. Delayed wound healing is a problem for all surgeons. The negative pressure dressing which is an alternate for standard dressing could improve and fasten healing. "Wound healing is a highly orchestrated process, which commences with the removal of debris and control of infection, inflammation clears the area for angiogenesis to occur to increase blood flow to the wound site, subsequently, the wound heals through deposition of granulation tissue, wound contraction and maturation" as described by Joseph in 2000. When any one of these step fails, the healing is not complete. The negative pressure dressing aids and hastens wound healing, by various means thereby bringing down the morbidity produced by wounds. It can act as a bridge between definitive procedure, by bringing down the transit time. It has been approved by Food and Drug Administration(FDA) for the treatment of non-healing wounds since 1997.

### Aims And Objectives

1. To compare the role of negative pressure dressing in wound management with conventional dressing.
2. To compare the rapidity in attaining bacteriological negativity with conventional dressing.

### II. Materials And Methods

The study population is randomized into cases and controls, where cases were treated with negative pressure dressing and controls were prescribed with conventional dressing. Wounds with necrotic tissue were mechanically debrided with scalpel, after which a foam based dressing was applied, covering the whole of the surface area of wound, which in turn was covered with adhesive dressing with airtight cover and embedded suction tubings and connected to negative pressure ranging between 80-125mmHg. The control group received conventional dressing. A wound swab was taken in all patients prior to commencement of treatment and repeated every third day, the samples were studied for gram stain and culture. The patients were started on broad spectrum antibiotic and later on switched over to specific antibiotics based on swab culture and sensitivity.

### III. Results

The majority of wounds in cases i.e., 13 (59%) were cured in 5 weeks as compared to only 8 (38%) in control. The shortest duration for achieving success was noted with cases group, about 2 week, the longest stay duration being 8 weeks, observed in control group. The majority of wounds were closed by a secondary intention and delayed primary closure in cases group, whereas by secondary intention only in control group. The mean duration of hospital stay in cases group being 3weeks and 6days as compared to 5 weeks and 6 days in control group. In the cases population, the majority (68%) of dressings were changed on once daily basis in contrast to control population who needed three dressings per day in 57% of the population. In the cases group, cellulitis patients received 6 days of antibiotics on an average in-contrast to 8 days of antibiotics with control

group. In cases with non healing ulcers, 11 days of antibiotics were administered, unlike 15 days in control group.

#### IV. Figures And Tables

**Table 1** Age Distribution Of The Study

Age Range In Yrs	Male	Female
21-30	2	3
31-40	1	3
41-50	12	2
51-60	8	4
61-70	3	1
71-80	2	2

**Table 2:** Distribution Based On Side Of The Wound

	Left	Right	Bilateral
Cellulitis	11	6	1
Non-Healing Ulcer	8	7	1
Burns	0	0	1
Amputation Stump	0	1	0

**Table 3:** Vac Vs Control On Duration Of Stay, Antibiotic

	Mean duration of stay in hospital	Minimum duration of stay in hospital	Maximum duration of stay in hospital
Vac	3w 6d	2w	8w
Conservative	5w 6d	2w 6d	8w

**Table 4:** Vac Vs Control-Duration Of Stay

		Mean duration of stay	Sd
Vac	Cellulitis	2w 2d	2d
	Non-healing ulcer	5w	1d
Conservative	Cellulitis	3w 1d	1d
	Non-healing ulcer	7w	6d

#### V. Discussion

Negative pressure dressings had been prescribed as a novel method in the wound healing management. It acts by stimulating the chronic wound environment, such as to keep bacterial burden in check and brings down chronic interstitial wound fluid stagnation, increases vascularity and cytokine expression and to an extent mechanically exploiting the viscoelasticity of peri-wound tissues. Vacuum assisted closure techniques are generally well tolerated and, with few contraindications or complications, is fast becoming a mainstay of current wound care. Hence, we planned to use negative pressure dressing for the treatment and fast healing of wounds. Our study composed of 43 patients who were randomly divided into two even groups. The demographic profile was statistically studied and found comparable with no significant difference between the two groups. Application of negative pressure over the wound bed allows the arterioles to dilate, increasing the effectiveness of local circulation, promoting angiogenesis, which assists in the proliferation of granulation tissue. We observed that the patients on negative pressure dressing had the early appearance of granulation tissue as compared to the patients treated by conventional dressings. Complete (100%) granulation was achieved earlier and in a higher proportion of patients in cases as compared to controls. It was observed that the use of negative pressure therapy resulted in an increased rate of granulation tissue formation and a higher proportion of healed wounds compared to saline gauze dressings. Colonization of a wound, corresponding to a level of  $>10^5$  colonies of bacteria per gram of tissue, has been recognized as a detrimental factor in the process of wound healing. VAC therapy enhances bacterial clearance, which may account for the wound healing effects.

We observed the safety of VAC over gauze dressings, in terms of fewer numbers of hospital stay, less frequent change of dressing in cases as compared to controls. In our study, the endpoint taken was a completely granulated wound or a wound ready for skin grafting, delayed primary closure or spontaneous healing by secondary intention. Both of the groups received similar treatment for the closure of the wound, the most common mode of wound closure being a secondary intention. Success rate in terms of complete granulation and readiness for closure by split-thickness skin grafting or secondary intention was more in cases compared to

control. The time taken for wound closure, number of antibiotics used, treatment related complications and outcome was better in cases compared to controls and overall resource utilization was more in control.

In conclusion, negative pressure dressings appears to be more effective, safe compared to conventional dressings in wound management.

## VI. Conclusion

We conclude by our prospective randomised control study that patients in vacuum dressing group had faster and better wound healing in comparison with control group receiving conventional dressing, irrespective of comorbid conditions. Infected wounds after debridement and heavy exudative wounds take a little long course towards recovery in comparison with uninfected wounds in both the study groups. The patients receiving negative pressure dressings achieve faster clearance from bacterial colonization.

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