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A Comprehensive Study On Effectiveness Of Wound Healing In Vacuum Assisted Wound Dressing.

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ABSTRACT

Delayed wound healing is a significant health problem, particularly in older adults. In addition to the pain and suffering, failure of the wound to heal also imposes social and financial burdens. Vacuum-assisted closure (VAC) therapy has been developed as an alternative to the standard forms of wound management, which incorporates the use of negative pressure to optimize conditions for wound healing and requires fewer painful dressing changes. To assess whether the management of non-healing wounds using VAC therapy will result in improved efficacy and safety outcomes compared with conventional methods. Present prospective, time bound study was done for 1 year from January 2023 to December 2023 over 50 subjects (25 cases and 25 controls). Details of cases were recorded including history and wound characteristics. Routine investigations were done. Follow up with size of wound, appearance of granulation tissue after day 0, 3, 6, 9, 12 and so on dressings were done. Patients managed with VAC had increased rate of re-epithelialization and fewer patients required repeat split thickness skin graft to the same site. VAC was more effective at treating various chronic and complex wounds, as there was a significantly greater reduction in wound volume, depth and treatment duration. VAC results in better healing than standard methods, with few serious complications. More rigorous studies with larger sample sizes assessing the use of VAC therapy on different wound types are required.

Keywords: Vacuum assisted closure, Negative pressure dressing.

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INTRODUCTION

The application of controlled levels of negative pressure has been shown to accelerate debridement and promote healing in many different types of wounds [1]. The optimum level of negative pressure appears to be around 125 mmHg below ambient and there is evidence that this is most effective if applied in a cyclical fashion of five minutes on and two minutes off. It is believed that the negative pressure assists with removal of interstitial fluid, decreasing localized edema and increasing blood flow. This in turn decreases tissue bacterial levels [2]. Additionally, mechanical deformation of cells is thought to result in protein and matrix molecule synthesis, which increases the rate of cell proliferation. Despite the significant costs involved, the technique is said to compare favorably in financial terms with conventional treatments in the management of difficult to heal wounds [3].

MATERIALS AND METHODS

Present prospective, time bound study was done for 1 year from January 2023 to December 2023 at over 50 subjects (25 cases and 25 controls). Dept of general surgery, Govt. Kilpauk Medical College And Hospital, Chennai, Tamil Nadu over 50 subjects (25 cases and 25 controls). Details of cases were recorded including history and wound characteristics. Routine investigations were done. Follow up with size of wound, appearance of granulation tissue after day 0, 3, 6, 9, 12 and so on dressings were done.

Inclusion criteria

- Wounds involving the diabetic foot
- Acute and Traumatic wounds
- Subacute wounds (dehiscenced wound)
- Pressure Ulcers
- Chronic open wounds
- Venous stasis ulcers

Exclusion criteria

- Fistulas or organs or body cavities
- Necrotic Tissue in eschar
- Osteomyelitis (Untreated)
- Malignancy in the wound
- Actively Bleeding wound
- Wounds at the sites other than lower limb
- Ischemic ulcers

RESULTS

Table 1: Age distribution of the patients.

Age Group (Years)	Cases for VAC	Cases in controls
18-30	7	3
30-40	10	15
40-50	6	4
50-65	2	3

Table 2: Percentage of granulation tissue formed in the wound bed at 0, 3, 6, 9, 12th days.

Days	Percentage of granulation tissue formed in VAC dressing (AVERAGE)	Percentage of granulation tissue formed by other conventional mode of dressings (AVERAGE)
0	0 %	0%
3	10 %	4 %
6	25 %	10%
9	40 %	30%
12	70%	40%

DISCUSSION

Negative pressure to assist wound healing has a positive impact on wound healing by enhancing granulation tissue formation and wound closure, thus providing a modern wound care system for the poor at an affordable cost. The present study involved 50 cases of wounds that fulfilled the inclusion criteria. Patients affected were most commonly in the age group of 41-60 years. There was a male preponderance with male: female ratio of 1.5:1. VAC dressing was done in wounds occurring in a variety of locations like foot, leg, sole and forearm. 90% of non-sterile pre-vac culture turned sterile after VAC (Vacuum-assisted closure) [4]. Compared to 28 days in control group. Further another improved characteristic of VAC was proved by our observation that percentage of granulation tissue formed in wound bed at 5, 10, 15 days were significantly higher in vacuum assisted dressing compared to control. VAC has been advocated as novel method in healing of wounds by stimulating the chronic wound environment in such a way that it reduces bacterial burden and chronic interstitial wound fluid, increase vascularity and cytokine expression and to an extent mechanically exploiting the viscoelasticity of periwound tissues [5]. The functional outcomes observed in this study were found to be similar to those reported in the aforementioned studies [6]. Specifically, 64% of patients achieved excellent results, 36% achieved good results, and no poor results were observed in 5% of patients. Chronic wounds are a significant contributing factor to the hospitalization of patients in surgical departments, leading to substantial costs associated with their management, resource utilization, and workforce allocation [7]. The utilization of Vacuum Assisted Closure (VAC) therapy has demonstrated a significant reduction in both the duration and financial burden associated with hospital stays, nearly halving these metrics. Empirical evidence demonstrates that it exhibits superiority in terms of both healing time and wound bed preparation duration when compared to traditional wound care methods. The utilization of this intervention effectively mitigates the occurrence of frequent pain experienced by patients during the frequent alteration of dressings for large wounds [8]. The VAC technique is associated with various complications, including localized infection, malodor, toxic shock syndrome, and anasarca [9]. Several contemporary therapeutic approaches have been proposed for the treatment of chronic wounds, encompassing ultrasound, laser therapy, electrical stimulation, and electromagnetic waves. Electrotherapy is a therapeutic approach that involves the electrical stimulation of wound cells using electrodes or pulsed magnetic fields in order to promote healing [10]. However, it has been observed that electromagnetic waves do not effectively reduce wound size, and the treatment cost associated with this method is high [11]. Additionally, there is insufficient evidence to support the use of low-level laser therapy for wound healing. Consequently, vacuum-assisted closure (VAC) therapy has emerged as the most cost-effective and efficient treatment option for nonhealing wounds that do not respond to conventional wound care methods [12].

CONCLUSION

VAC results in better healing than standard methods, with few serious complications. More rigorous studies with larger sample sizes assessing the use of VAC therapy on different wound types are required. With proper training to ensure appropriate and competent use, VAC is simple to use and appears to be promising alternative for the management of various wound types.

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