

EFFICACY OF VACUUM ASSISTED CLOSURE IN MANAGEMENT OF OPEN WOUNDS AS COMPARED TO MOIST WOUND DRESSING-EXPERIENCE AT CMH RAWALPINDI

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ABSTRACT

Objective: To compare the efficacy of vacuum assisted closure (VAC) therapy against regular moist wound dressings in reducing the surface area of open chronic wounds by at least 5 mm² in terms of early closure of wound.

Study Design: Randomized controlled trail.

Place and Duration of Study: This study was conducted at general surgery department CMH/MH Rawalpindi from Jun 2011 to Dec 2011 over a period of 06 months.

Material and Methods: A total of 278 patients (139 in each group) were included in this study. Group A received VAC therapy while moist wound dressings applied in group B.

Results: Mean age was 54.9 ± 7.2 and 53.4 ± 8.9 years in group A and B, respectively (statistically insignificant ($p=0.12$). In group A, 96 patients (69.0%) and in group B 92 patients (66.2%) were male while 43 patients (31.0%) in group A and 47 patients (33.8%) in group B were female the difference being statistically insignificant ($p=0.608$). In group A, 63 (45.3%) patients showed significant reduction in the size of the wound while only 41 (29.5%) patients in group B had adequate wound healing at the end of 04 weeks, the difference being statistically significant ($p=0.0064$).

Conclusion: VAC therapy decreases wound size more effectively than moist wound dressing technique. It definitely reduces hospital stay and ensures early return to work.

Keywords: Moist wound dressing, Open wounds, VAC.

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INTRODUCTION

All types of wounds acute or chronic especially non-healing type are one of the most common surgical conditions a surgeon comes across. Diabetic ulcers, pressure sores, large post traumatic wounds, wounds secondary to necrotizing fasciitis¹ and infected surgical site infections refuse to heal and remains an enigmatic challenge². This demands much more care, longer stay at the hospital and higher cost³.

Traditionally moist wound dressing was used as a standard management in wound care but during the last two decades a wide variety of innovative dressings have been introduced which include polyglactin 910 mesh⁴, honey in diabetic wounds, skin grafting in chronic wounds and VAC therapy techniques. VAC promotes rapid healing of acute and chronic wounds resulting in decreased hospitalization and an earlier return of function. Vacuum assisted closure is achieved by applying intermittent negative pressure of approximately 125 mm Hg to hasten formation of granulation tissue. This study was conducted to identify the best dressing technique for wound management in our setup.

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MATERIAL AND METHODS

These randomized controlled trials were conducted at Department of Surgery CMH/MH Rawalpindi from 08 June 2011 to 07 Dec 2011. Inclusion criteria was adults of both gender above 13 years of age having open wounds >2 cm² on the trunk or limbs not involving bone 6 weeks or more older. Exclusion criteria was age <13 years, acute wounds, Infection (urinary tract, pneumonia, wound infection, osteomyelitis), immunosuppression or steroid therapy, diabetes mellitus, malignancy and fistulae. In VAC, wound is debrided and a foam with multi hole drain is placed over the wound. It is then sealed with adhesive tape. Drain was attached to a negative pressure system that provides negative pressure of 125 mmHg at intermittent interval. In moist wound dressing technique, only saline soaked dressing is placed on the wound and surgical sticking was applied. During study, 278 Admitted patients in surgical unit I, II, III, plastic surgery ward and orthopedic unit with chronic non healing wounds were included. Patients were randomly divided into two equal groups of

gauze. The wound was assessed weekly for four weeks following initial debridement and at weekly interval with reference marker including patient ID, date and size (surface area) in three dimensions. Wound dimensions and surface area was determined in a blind fashion using University of Texas Health Centre at San Antonio image tool version 3.0.

Data was analyzed on SPSS version 19.0. Mean and standard deviation were calculated for quantitative data like age while frequency and percentage were calculated for qualitative data like gender and efficacy. Chi square test was used to compare the efficacy of healing of wound. *p*-value <0.05 was taken as significant

RESULTS

A total of 278 patients were studied. Mean age was 54.9 ± 7.2 and 53.4 ± 8.9 years in group A and B, respectively (statistically insignificant *p*=0.12). No statistically significant difference was found in gender distribution of both groups. Mean initial wound size in group A was 15.07 ± 2.92 cm² and 15.09 ± 2.81 cm² in group B which

Table-1: Demographic variable of the patients (n=278) who were included in the study.

Demographic variable	Group-A (n=139)	Group-B (n=139)	<i>p</i> -value
Age (years) Mean ± SD	54.9 ± 7.2	53.4 ± 8.9	0.12
Sex ratio M:F	2.23:1	1.96:1	0.608
Initial wound Size cm ²	15.07 ± 2.92	15.09 ± 2.81	0.95

Table-2: Distribution of cases by efficacy (n=278)

Efficacy	Group-A (n=139)		Group-B (n=139)		<i>p</i> -value
	No.	%	No.	%	
Yes	63	45.3	41	29.5	0.0064
No	76	54.7	98	70.5	
Total	139	100.0	139	100.0	

139 patients each using random number table. Group A included patients in whom VAC therapy was applied while group B received moist wound dressings. Wounds with necrotic tissue or debris underwent debridement before the initiation of therapy. Frequent examination of the wound for healing and a sign of infection was done. VAC dressing was changed every 48 hours while group B received daily dressings by conventional methods i.e. cleaning with normal saline & dressing the wound with saline-soaked

was statistically insignificant (*p*=0.97). Number of patients in each group, subgroups and there mean ages are given in table-1 and fig-1 respectively.

Our main end point of wound healing/reduction in size was compared in both groups using Chi Square test and a reduction in size > 5mm was considered significant. In group A, 63 (45.3%) patients showed significant reduction in the size of the wound while only 41 (29.5%) patients in group B had adequate wound

healing at the end of 04 weeks. Clinical efficacy in terms of wound area reduction was determined and compared in both groups that revealed statistically significant faster healing in VAC group as compared to moist wound dressing group ($p=0.0064$) as depicted in table-2.

DISCUSSION

Acute and chronic wounds and are a major cause of morbidity and impaired quality of life. They affect at least 1% of the population and represent a significant risk factor for hospitalization, amputation, sepsis, and even death. Wound healing is a complex series of events, broadly classified into inflammatory, proliferative, and remodeling phases. The treatment of difficult – to -manage and chronic wounds remains a significant challenge to practitioners, a cause of pain and discomfort to the patients, incurring tremendous cost⁵.

For centuries, gauze has been used in local wound care, mainly due to its low price and simplicity. In 1950s a new concept, that wound healing is optimal when it is kept in a moist environment rather than air dried, was introduced. Since then, a large variety of occlusive or semi-occlusive dressings, topical applications, and other products were developed for the treatment of all kinds of wounds. Modern wound-healing agents include hydrocolloid, alginates, hydrogel, hydrofiber, paraffin gauze dressings, as well as many others types of moist dressings and topical agents. The choice of the ideal regimen remains controversial due to the lack of good evidence from well conducted RCTs, and depends mainly on the clinicians' preference⁶.

Negative pressure therapy has been used in clinical applications for over five decades. The concept of applying topical negative pressure in the management of wounds emerged in the late 1980s and is increasingly used for a wide variety of wounds. The technique is also known as vacuum assisted closure (VAC), negative pressure wound therapy (NPWT), vacuum sealing technique (VST), sealed surface wound

suction (SSS), sub atmospheric pressure therapy or dressing, foam suction dressing, and vacuum pack technique (VPT)⁷.

Complex effects at the wound-dressing include changes on a microscopic, molecular level and on a macroscopic, tissue level: interstitial fluid flow and exudates management, edema reduction, effects on wound perfusion, protease

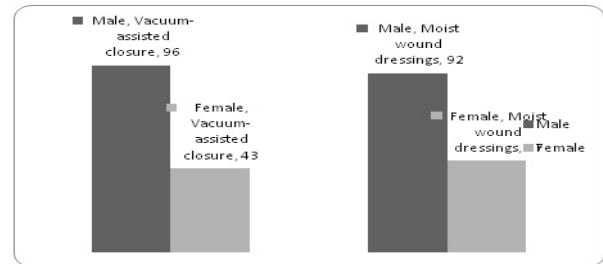


Figure-1: Gender distribution of the patients undergoing clinical trial n=278.

profiles, growth factor and cytokine expression and cellular activity, all leading to enhanced granulation tissue formation, reduced bacterial colonization rates and improved wound-healing parameters⁸⁻¹⁰. Furthermore, it reduces wound surface area by the traction force of negative pressure, which increases mitosis of tissue around the wound^{11,12}.

In a prospective, randomized, clinical study, Tauro et al¹³ in India observed that 90% granulation was achieved in 22 patients in VAC group after 10 days compared to 5 patients in normal saline group. Mouès et al¹⁴ and weed et al¹⁵ reported similar results while McCallon SK et al, in a study performed in Los Angeles U.S.A. on diabetic foot wounds, showed that satisfactory healing i.e. 100% granulation tissue in the VAC group was achieved in 22.8 ± 17.4 days, compared to 42.8 ± 32.5 days in the normal saline dressing group²⁰.

In current study, we found a statistically significant difference in the percentage change in the wound size between both the groups ($p=0.0064$). VAC group was more efficacious when compared with Moist Wound Dressing group ($p=0.0064$). Our results are consistent with the findings of Blume et al⁵.

The demographical profile was statistically studied and found comparable with no significant difference between the groups ($p=0.12$ for age and $p=0.608$ for gender). The mean age of patients in VAC group was 54.9 ± 7.2 years and in Moist Wound Dressing group was 53.4 ± 8.9 years which was comparable to the multicenter randomized controlled trial enrolling 342 patients done by Blume et al⁵ who had a mean age of 58 years. The sex distribution was also similar to the above quoted study that had majority of the male patients. Our results are also comparable with the study of Nain et al Departments of General Surgery, Oswal Hospital, Ludhiana (Punjab) India¹⁷. Our study is consistent with McCallon et al¹⁶, who also observed that the wound volume and depth decreased significantly in VAC dressings as compared to moist gauze dressings (59% vs 0% and 49% vs 8%, respectively)¹⁸.

It was observed that there was a decreasing trend in the presence of wound discharge in both the groups. However, it was noted that the rate of disappearance of wound discharge was faster in the vacuum assisted wound closure group as compared to the moist wound dressing.

CONCLUSION

Analysis of the results of our data demonstrates that VAC decreases wound size more effectively than moist wound dressing technique. VAC definitely reduces wound size early which results in early wound closure or grafting thus reducing hospital stay, ensures early return to work and reduces work load by reducing the number of times dressings are changed and thus far outweigh the utility of moist wound dressings especially in military setups.

CONFLICT OF INTEREST

This study has no conflict of interest to declare. Abstract and results of this study were accepted and presented in an oral presentation at the International conference on Medical Education.

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