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Custom made vacuum assisted dressings for wounds in department of general surgery at a tertiary care centre in U.P, India

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Abstract

Background: The initial management of open wounds is copious irrigation and thorough debridement, which can cause significant tissue defects. Definitive wound cover can only be planned once the wound is healthy and patient is stable. Till then it requires a temporary closure to prevent the exposed structures from desiccation and bacterial contamination. Commercially available VAC is an effective but expensive therapy in such a case. Custom made VAC is a cheaper alternative.

Material and Method: 44 patients attending OPDs and IPD in the department of general surgery at a tertiary care hospital between January 2021 to December 2022. It was a prospective randomized controlled longitudinal study. Study was conducted after approval from Internal Ethics Committee within time period of 12 months.

Results: There were a total of 44 patients of which the majority of the patients were in the age group of 61-70 years followed by 18-30 years. There were more males (42) than females (2). Class 4 wounds were the major type of wound as seen consisting of 26 patients followed by class 3 wounds in 18 patients. The size of wound varied with majority being in size of 11-5 0cm2.

Conclusions: This study gives a clearer picture showing that smaller wounds can be effectively closed primarily with VAC dressing but larger wounds require secondary treatment modalities.

Keywords: vacuum assisted closure; negative pressure wound therapy, custom-made

Introduction

A wound may be defined as any disruption of the integrity of skin, mucous membrane or organ tissue. Wound healing is an exceedingly complex process ^[1, 2]. Wound healing has four phases namely exudative, resorptive, proliferative and regenerative phase ^[2, 3]. An important treatment principle in practical terms is to support the physiological course of the wound healing process. In the early phases of wound healing, blood and plasma constituents, clots and cell detritus are present in the wound. These should be removed by mechanical wound cleansing and is an important precondition for rapid, uncomplicated wound healing and is known as debridement ^[4]. With the increasing understanding of wound healing process many new modalities have been tried for rapid wound healing over the past two decades like topical growth factors, hyperbaric oxygen, cultured skin derivatives, a wide variety of dressing regimens and some mechanical devices ^[5]. One such device is Vacuum-assisted closure (VAC) device which has gained popularity. The use of sub-atmospheric pressure dressings, available commercially as the vacuum-assisted closure (VAC) device, has been shown to be an effective way to accelerate healing of various wounds. VAC dressing has many advantages including wound cleansing by continuous drainage, modification of the wound environment and reduction of bacterial colonization, and maintaining a moist environment ^[4]. Using a pig model, Morykwas *et al.* discovered that wounds treated with intermittent sub-atmospheric negative pressure had increase in granulation tissue formation compared with control wounds ^[6]. The optimal sub-atmospheric pressure for wound healing appears to be approximately 125mm Hg ^[7]. It has been shown that VAC dressings increased wound healing rate, accelerated wound healing time and reduced hospital stay. However, commercial VAC dressings are associated with increased medical costs. Commercial VAC dressing is not feasible for poor population of India as it is costly as well as not available easily in all parts of India. This is where custom made VAC dressing comes into play as it is significantly cheaper and can be made by easily available medical supplies. The aim of this study is to compare the effectiveness of custom made vacuum assisted dressing.

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Materials and Methods

Patients attending OPDs and IPDs in the department of General Surgery at a tertiary care hospital between January 2021 to December 2022. Patients were selected at random. It was a prospective randomized controlled longitudinal study. Study was conducted after approval from Internal Ethics Committee within time period of 12 months.

Inclusion criteria

1. Adult patients with injuries involving significant soft tissue loss.
2. Patients willing to join study

Exclusion criteria

1. Patients with other life-threatening conditions.
2. Patients with coagulation disorders or active bleeding.
3. Wounds with exposed arteries or veins.
4. Patients not willing to join the study.

Results

There were a total of 44 patients of which the majority of the patients were in the age group of 61-70 years followed by 18-30 years.

Table 1: : Age Distribution

Age group	Number of patients
<18	2
18-30	8
31-40	4
41-50	6
51-60	6
61-70	12
71-80	6
Total	44

There were more males (42) than females (2).

Table 2: Sex Distribution

Sex	Number of patients
Male	42
Female	2

Trauma was the major factor along with D.M with or without superadded infections.

Table 3: Causes of Wound

Cause of wound	Number of patients
Diabetes mellitus	14
Trauma	10
Infective aetiology	10
Buerger's disease	6
Burn	2
Pressure sore	2

Class 4 wounds were the major type of wound as seen consisting of 26 patients followed by class 3 wounds in 18 patients.

Table 4: Class of Wound

Class of wound	Number of patients
Class i – clean	0
Class ii – clean contaminated	0
Class iii – contaminated	18
Class iv – dirty	26

The size of wound varied with majority being in size of 11-50 cm².

Table 5: Size of Wound

Size of wound before vac	Number of patients
Very small (11-50 cm ²)	20
Little (51-100cm ²)	12
Medium size (101-200 cm ²)	8
Large (201-300 cm ²)	2
Very large (>300 cm ²)	2

The number of dressings required varied with size of the wound. Smaller wounds required lesser number of dressings as compared to larger wounds.

Table 6: Number of VAC Dressing Required

Size of wound	Number of dressings required
Very small (11-50 cm ²)	2-5
Little (51-100cm ²)	3-7
Medium size (101-200 cm ²)	3-8
Large (201-300 cm ²)	5-10
Very large (>300 cm ²)	2-5 dressings to get healthy granulation

The approximate cost of VAC and the total cost of VAC therapy varied with size of the wound.

Table 7: Cost of Custom VAC

Size of wound	Cost of first custom vac	Total cost of vac
Very small (11-50 cm ²)	~900 inr	1000-1500 inr
Little (51-100cm ²)	~1000 inr	1300-1800 inr
Medium size (101-200 cm ²)	~1250 inr	1500-2000 inr
Large (201-300 cm ²)	~1600 inr	2000-3000 inr
Very large (>300 cm ²)	>2000 inr	>3000 inr

The photographs' show images of a patient in pre and post operative period.



Fig 1: Pre operative picture



Fig 2: Post operative picture

Discussion

There are few high quality studies on VAC therapy for wound management with sufficient sample size and adequate power to detect differences, if there are any, between VAC custom made and commercial VAC. VAC is established as a promising technology in the field of wound healing with multiple applications in a variety of wounds, including difficult to heal wounds also ^[7]. Despite reports of success, a recent systematic review has indicated that there is a paucity of randomized, controlled trials in terms of patient allocation concealment, cost of treatment, and follow up ^[8]. Better studies with larger sample sizes assessing use and cost effectiveness of VAC therapy on different wound types are required, as the available evidence is sparse. However based on the data from studies available, VAC does show better healing, and may be used a promising modality for management of various wounds.

Conclusion

This study gives a clearer picture showing that smaller wounds can be effectively closed primarily with VAC dressing but larger wounds require secondary treatment modalities.

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