

Cost effectiveness of commercial vacuum-assisted closure (VAC) versus custom made vacuum-assisted closure (VAC)

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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 may be a cheaper alternative. This study compares cost effectiveness of commercial VAC and custom made VAC therapy.

Material and method: This study was done on patients admitted to orthopaedic ward at MGM medical college and hospital, kamothe, Navi Mumbai. 40 patients were included in the study (20 each group), 14 females and 26 males having indications for VAC therapy. Patients were evenly distributed in both groups according to wound size so that both groups receive comparable size wounds.

Results: Mean duration till definitive wound coverage was possible was recorded for each group. In commercial Vac group it was 12.6 days with average cost of therapy being 13,400Rs. While in custom made VAC group it was 17.3 days with average cost of therapy being 7800Rs.

Conclusions: This study shows that custom VAC is comparatively more cost effective as compared to commercial made VAC. Hence custom made VAC can be an effective and cheaper alternative to commercial VAC where it is not available or is not affordable by the patients.

Keywords: Vacuum assisted closure; Wound management; negative pressure wound therapy; wound bed score

Introduction

First described by Morykwas and Argenta, the VAC system applies a sub-atmospheric, or negative, pressure to the wound bed via a polyurethane foam dressing. The classic VAC® system (KCI, San Antonio, TX) comprises the vacuum pump (negative pressure unit), canister, tubing to connect the dressing to the pump and VAC dressing pack (foam and occlusive drapes)[1]. The foam can be used to pack open cavity wounds and can also be cut to size to fill undermining areas. The polyurethane foam dressing enables equal distribution of the negative pressure over the whole wound bed and also allows exudate to flow freely for collection and removal in the canister[2]. Applying negative pressure to the wound bed via the VAC pump removes exudate and promotes a moist, wound-healing environment. It also reduces edema in the surrounding tissues that, can impair wound-healing by reducing localized blood flow[3]. VAC promotes granulation tissue by increasing capillary calibre and blood volume and also by stimulating angiogenesis[4]. Vacuum-Assisted Closure Therapy increases local interleukin-8

and vascular endothelial growth factor levels in traumatic wounds[5]. VAC device has wide range of clinical applications, including treatment of infected surgical wounds, traumatic wounds, pressure ulcers, wounds with exposed bone and implants, diabetic foot ulcers, and venous stasis ulcers[6]. A major setback for VAC therapy is high cost of commercial VAC dressings. Due to its high cost VAC has not been very extensively used in low resource settings. A similar dressing apparatus can be made with help of easily available materials and may produce comparable results at much affordable cost. In this study we have compared cost effectiveness of such a custom made VAC with commercial VAC.

Materials and method

This study was conducted on the patients admitted in orthopaedic ward (May 2015 to June 2017) at MGM medical college and hospital, kamothe, Navi Mumbai. Total of 40 patients (26 male; 14 female) included in this study having indications for VAC therapy. 20 patients were treated with commercial VAC and 20 patients treated with custom made VAC. Wound size of all patients were accessed and patients were evenly distributed in both groups according to wound size so that both groups receive comparable size wounds.

Inclusion criteria

1) Wounds with or without associated fracture where primary closure not possible.

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Figure 1: Custom Made VAC applied on lower limb wound



Figure 2: wound after application of custom made VAC

- 2) Wounds after surgical debridement
- 3) Necrotizing fasciitis
- 4) Chronic Ulcers
- 5) Ruptured abscess

Exclusion criteria

- 1) Patients with wound with exposed vasculature
- 2) Patients with wound with exposed nerves
- 3) Patients with bleeding disorders.
- 4) Open fractures that could be closed in initial surgery.
- 5) Presence of eschar in wound.

VAC dressings were continued until the definitive wound closure surgeries like split skin grafting or secondary suturing can be done.

Patients were evaluated clinically and for the appearance of healthy granulation tissue with number of days taken for definitive wound closure after using custom made or commercial VAC.

Custom made VAC

Technique:

The wound bed is cleaned with normal saline. Any necrotic tissue or slough is removed. Bactigras or similar dressing applied to the wound bed. Sterile sponge foam is cut slightly larger than the wound and wound packed with it and suction tube is laid on the sponge and sponge is sealed with Ioban. Other end of suction tube is attached wall suction apparatus. Continuous suction is maintained with wall suction and can be regulated with

Table 1: comparison between commercial Vac and custom made VAC

	CASES	MALE	FEMALE	MEAN NUM OF VAC APPLIED	MEAN DAYS TO SURGERY	TREATMENT COST
COMMERCIAL VAC	20	15	6	2.5	12.6	13,400
CUSTOM VAC	20	11	8	5.9	17.3	7800



Figure 3: Commercial VAC Applied to lower limb wound



Figure 4: wound after commercial VAC dressing

help of regulator. Generally -125mm hg pressure is used but can be regulated if painful.2

Cost of custom made VAC:

- Autoclaved Sponge foam used in one dressing - 50 rupees
- One bactigras cost rupees - 50 rupees
- Vaccum suction machine(or wall suction unit)
- One Ioban cost - 1000 rupees
- Suction catheter 14 no. - 50 rupees

So, Total cost of one custom made VAC dressing - 1150 rupees

Custom made VAC dressings were changed every 3 days.

Commercial VAC

Commercial VAC is applied in similar manner but is attached to commercial VAC pump unit rather than the wall suction unit. Commercial VAC costs 5000 Rs per dressing and is changed after 5 days.

Results:

A total of 40 patients were included in this study out of which 26 were male and 14 were female. Out of 40, 20 were applied commercial VAC and 20 were applied custom made VAC for a time period of 3 days in custom vac and 5 days in commercial vac. Out of 14 females, 8 were applied custom made vac and 6 were applied commercial VAC. Out of 26 males 11 were applied custom made VAC and 15 were applied commercial VAC. The average days of VAC dressing before definitive wound closure done for custom made VAC was 17.3 days and for commercial vac it was 12.6 days. The custom made VAC cost 1150 rupees for each

dressings whereas commercial VAC cost 5000 rupees per dressing. The average cost of commercial VAC in this study was 13,400 rupees and for custommade VAC was 7,800 rupees. Hence custom made VAC was comparatively cost effective to commercial VAC.

Discussion:

There were 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 as a promising modality for management of various wounds.

Conclusion:

The cost of VAC dressings can be significantly lowered if locally available materials are used. Application of such CUSTOM MADE VAC is simple, but requires training and expertise. This study shows that custom VAC is comparatively more cost effective as compared to commercial made VAC. Hence custom made VAC can be an effective and cheaper alternative to commercial VAC where it is not available or is not affordable by the patients.

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