



Evaluating the Outcome of Vacuum Assisted Closure of Surgical Wound - A Retrospective Single Centre Review

Ikechi CO*, Mohamed H, Shah A, Wilson S, Pangeni A, Fernandes R and Shrestha AK

Department of General Surgery, William Harvey Hospital, East Kent Hospitals University NHS Trust, UK

Abstract

Background: Vacuum-Assisted Closure (VAC) is a non-invasive, active wound management system that subjects a wound bed to sub-atmospheric pressure within a closed environment. It is widely accepted for a variety of open abdomen and non-healing chronic wounds. The aim of the study was to evaluate the outcome of VAC for surgical wounds in a District General Hospital (DGH).

Method: A retrospective review on prospectively-collected data of 40 patients was conducted over a period of January 2018 to February 2019, recording patient demographics, diagnosis, comorbidities, indications for the application of VAC, duration of therapy and adverse events. All adult surgical patients that required VAC were included in the study. The exclusion criteria were patients from other non-general surgical specialties and patients with bed sores.

Result: A 40 patients (M:F 16:24) with a median age of 62 (30-96) years were included in the study. Median Body Mass Index (BMI) of patients was 27 (19.2-44). 28%, 62% and 10% had a BMI less than 25, between 25-35 and above 35. The VAC application was mostly (75% n=31) used for anterior abdominal. Wound dimensions revealed a median length of 7 cm (range 3-20) and median width of 4 cm (range 1-31). Two patients (4.7%) had recorded complications.

Conclusion: VAC in the management of wounds was noted to be a safe. The use of VAC in the center yielded low a complication rate and achieved good healing outcomes. Therefore, the use of VAC should be considered if indicated.

Introduction

Vacuum Assisted Closure (VAC) therapy has been a common practice in the NHS, delivered usually by skilled and dedicated VAC therapy nurses in both in-patient settings and community settings. However, the actual clinical efficacy, financial burden and complexity of its use with introduction of newer devices and components have always been controversial because of lack of high-level evidence [1,2]. The aim of the study was to evaluate the outcome of VAC of surgical wounds in a District General Hospital (DGH).

Methodology

A retrospective review of prospectively collected data over 40 patients was conducted in our DGH over a period of January 2018 to February 2019 recording patient demographics, diagnosis, comorbidities, indications for the application of VAC, duration of therapy and adverse events including those related and unrelated to the treatment process. All adult patients with general surgical wounds not amenable for simple wound dressing were included in the study. The VAC therapy was performed by experienced doctors and trained nurses. Data on Patient demographics including Body Mass Index (BMI), diagnosis, comorbidities (Diabetes mellitus, chronic obstructive pulmonary disease, Immunosuppression etc) and ASA grade were collected. Further data regarding wound characteristics such as anatomical site, dimensions, type and primary operation including etiology and VAC therapy related variables such as duration, pressure, type (continuous vs. intermittent) and complications were recorded. Multiple factors that impair wound healing and comorbidities were analyzed such as immunosuppression, cardiovascular disease, diabetes, malignancy and BMI.

Results

Data of 40 patients were analyzed. The Male to female ratio in the study was 16:24. The median age of patients was 62 (30-96) years. The majority (62%) of the patients were overweight or obese with BMI in the range of 25-35 and 10% with a BMI above 35 Figure 1. This was followed by 28% with a

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*Correspondence:

Chijioke Ikechi, Department of General Surgery, William Harvey Hospital, East Kent Hospitals University NHS Trust, UK,

E-mail: chijioke.ikechi@nhs.net

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Figure 1: Patient presented with severe sepsis and hyperglycaemia and on catheterization, it was noted that the scrotal skin was erythematous and that the scrotum had doubled, in size within a 24-hour period. Urgent CT which confirmed Fournier's gangrene as was suspected. Radical debridement of scrotum and perineum following Fournier's gangrene with formation of a sigmoid colostomy was done.



Figure 2: VAC dressing with drains *in situ* and pressure of about 125 mmHg.



Figure 3: Post vac dressing and skin grafting outcome. A total of 43 days treatment with good wound healing and no VAC complication.

normal BMI. However, there was no direct correlation between BMI and requirement or complication related to VAC therapy. ASA score was recorded in relation to the patient comorbidities and showed that the majority (85%) were either ASA II (39%, n=15) or III (46%, n=18). Etiology of VAC application was postoperative abdominal surgery in the majority of the sample (n=31) with wound located over anterior abdominal wall making up 78% of the study population. Of these, majority were surgical site infection (n=29) and two patients received VAC as a method of temporary abdominal closure (n=2). Other etiologies included post examination under anesthesia of anorectum with abscess drainage (n=6), pilonidal sinus surgery (n=2) and an extensive perineal debridement for Fournier's gangrene (n=1) Figure 2. The wound size revealed a median length of 7 cm (range 3-20) and median width of 4 cm (range 1-31). Application of VAC dressing was initially done either in theatre following an operation (42.9% n=19) or later on in ward (57.1% n=24). The total duration of VAC therapy varied between patients with a median value of 21.5 days (range 2-120). The majority (92.5%, n=37) of the wounds healed

Table 1: Following table summarizes the different variables considered in the study.

Variables	Values
Total Number of Patients	40
Patient Characteristics	
Male	16
Female	24
Median Age in years	62 (31-96)
BMI	
<25	11 (28%)
25-35	24 (62%)
>35	4 (10%)
ASA grade	
ASA-I	6 (15%)
ASA –II	15 (39%)
ASA-III	18 (46%)
Surgery	
Laparotomy (abdominal wound)	31
Pilonidal Sinus Surgery	2
Extensive perineal debridement	2
Post Examination under anesthesia and Incision and Drainage of Abscess (Perianal Region)	5
Wound Characteristics	
Median Length in cm	7 (3-20)
Median Width	4 cm (1-31)
VAC Therapy	
Continuous	40
Complications	2 (5.1%)
Median Duration	21.5 days (range 2-120)

as expected requiring no further intervention. However, there were only two documented complications which mandated abandoning VAC therapy Figure 3. One patient had a minor complication of skin irritation/contact dermatitis due to the dressing material which and was treated conservatively and VAC discontinued while another patient who had a background of crohns developed an intestinal fistula following the application of VAC therapy. However, it wasn't determined if the fistula was already present or the VAC was the cause of it, but VAC was discontinued, the patient was managed conservatively and the fistulae healed consequently. Two patients had an extensive perineal debridement for Fournier's gangrene and they were secondarily transferred to a plastic team for skin grafting after initial VAC therapy and had a good outcome Table 1. None of our patients developed infection and sepsis, foam retention in the wound, tissue adherence, bleeding or severe pain [3].

Discussion

Negative pressure wound therapy, with hurdles of multiples criticism since its first introduction in 1990s, has seen a wider acceptance in its applications worldwide [4]. Its efficacy has been positively advocated for acute as well as chronic wounds, including those of vascular and diabetic origin [5,6]. The mechanism is complex and not all of its aspects are yet completely understood. Creating a controlled negative sub atmospheric pressure of about 40 to 200

mmHg provides a potential gradient which helps reduce exudation and bacteria colonization. Increased exudate can be caused by low albumin, congestive heart failure (right-sided), venous insufficiency, outflow obstruction and infection which all must be corrected. It also decreases local oedema thus providing efficient blood flow and improved tissue granulation. This thus, provides an ideal wound healing environment [7,8]. Also, there are numerous patient factors that have to be considered in healing processes which affect wound healing in which most were looked at in the study, but despite these things the complication rate was relatively low. They can be classified into the systemic and the local factors. The Systemic factors include; Obesity, medications (chemotherapy, glucocorticoid steroids, immunosuppressive drugs (example tacrolimus) and non-steroidal anti-inflammatory drugs), smoking and chronic alcohol intake, immunocompromised conditions (cancer, radiation therapy, AIDS, poor nutrition), age and gender, sex hormones, stress, ischemia, co-morbidities: diabetes, keloids, fibrosis, hereditary healing disorders, jaundice and uremia. Local factors include; Ongoing sepsis, oxygenation, foreign body, and vascularity of the wound [9-11]. The management of abdominal trauma (in the settings of Damage control surgery), and abdominal sepsis (with inability to or inappropriate for definite abdominal wall closure) has been helped substantially by VAC as temporary closure method. It provides easy re-access to the abdomen and defies outward movement of abdominal musculature from midline.

Conclusion

Our limited study revealed the use of VAC dressing showed satisfactory results in post abdominal wound healing. Its advantages ranged from excellent cost effectiveness, provision of mechanical approximation of wound edges reduced the number of dressing changes and decrease damage to underlined tissue. Low complication rate was recorded in this study with acknowledgment of its ease of use (most patients were successfully managed in the community) with patient's satisfaction. Subsequent to the discovery of this research, it can be clearly stated that the introduction of VAC therapy has led to reduced frequencies of dressing changes, provision of closed moist healing environment with good control of odour and exudates, reduction in complexity and number of surgical procedures in wound management. The application of VAC shows an accelerated healing process compared to conventional wound dressing methods.

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