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Case report

Well-promising outcomes with vacuum-assisted closure in an infected wound following laparotomy: A case report

A. Daskalaki [a], S. Xenaki [a], M. Venianaki [a], A. Topalidou [b, *], E. Athanasakis [a], E. Chrysos [a, b], G. Chalkiadakis [a, b]

[a] Department of General Surgery, University Hospital of Heraklion, Crete-Greece
[b] Faculty of Medicine, University of Crete, Greece

HIGHLIGHTS

- A VAC device with automated solution distribution (with saline solution plus hypertonic saline), continuous pressure of −125 mmHg with equal distribution was applied.
- Within 4 days bacterial culture was negative.
- On the 7th day the wound was half in diameter and depth.
- After 15 days in total, therapy was discontinued achieving closure.

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ABSTRACT

Introducation: Negative pressure wound therapy (NPWT) represents an alternative method to optimize conditions for wound healing. Delayed wound closure is a significant health problem, which is directly associated with pain and suffering from patient's aspect, as well with social and financial burden.
Presentation of case: We report a case of vacuum-assisted wound therapy with hypertonic solution distillation and continuous negative pressure application, in an infected wound after laparotomy for incisional hernia reconstruction with mesh placement. Negative pressure was initiated at the wound margins after failure of conventional treatment with great outcomes, achieving a total closure of the incision within two weeks.
Discussion: Each wound has particular characteristics which must be managed. Vacuum assisted closure (VAC) with continuous negative pressure and simultaneous wound instillation and cleanse can provide optimum results, reducing the cavity volume, by newly produced granulated tissue.
Conclusion: The simultaneous use of instillation and constant pressure seemed to be superior in comparison with NPWT alone. Compared to conventional methods, the use of VAC ends to better outcomes, in cases of infected wounds following laparotomy.

1. Introduction

Surgical wound complications constitute a common problem for both surgeon and patient. There is a broad spectrum of complication severity, ranging from medically unimportant but certainly attention-demanding, to life threatening situations. The most common postoperative wound impairments are seroma, haematoma, necrosis of wound margins and infections. Most of them improve with conservative measures, like daily thorough cleansing of the wound margins and targeted antibiotic therapy [1]. Negative pressure wound therapy (NPWT) is used to promote wound healing in a wide range of difficult to manage acute and chronic wounds [2].

Abbreviations: NPWT, Negative Pressure Wound Therapy; VAC, Vacuum Assisted Closure; MDWT, Microdeformational Wound Therapy; TNP, Topical Negative Pressure therapy; SWT, Subatmospheric Wound Therapy; PVA, Polyvinyl Alcohol PVA; GFS, GranuFoam Silver.

* Corresponding author. University of Crete, Faculty of Medicine, University Hospital of Heraklion, Crete, Greece.
E-mail addresses: daskalaki.a@hotmail.com (A. Daskalaki), sofiabecks@yahoo.gr (S. Xenaki), mb12.med@gmail.com (M. Venianaki), atopalidou@gmail.com (A. Topalidou), eliasathanasakis@yahoo.gr (E. Athanasakis), manolischrysos@gmail.com (E. Chrysos), chalk@med.uoc.gr (G. Chalkiadakis).

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Apart from open abdomen though, there are limited reported publications concerning the vacuum assisted closure (VAC) outcomes, in an impaired wound following scheduled laparotomy for a routine surgical issue, like incisional hernia repair with mesh placement.

2. Presentation of case

We report a case of a 46 year-old woman who was referred to our department for incisional hernia reconstruction. The patient underwent two laparotomies previously, one for left oophorectomy due to an ovarian cyst four years ago and a second one, three months later for complete hysterectomy and right oophorectomy due to cancer that was diagnosed at the first operation. Plastic reconstruction was performed using a 25 × 25cm double layer polypropelene mesh was used. It was place subcutaneously and was stabilized on the transverse fascia using metallic fascia clips. Before placing the mesh no component separation was conducted. Abdominal pressure was released. The gap was stitched and flaps in diameter of 10cm circumferentially where created so that the mesh could be placed.

A drain tube was placed intraperitoneal to the right Douglas space and two more drains under negative pressure were placed subcutaneous over the mesh. The first subcutaneous drain was removed on the 3rd and the second one on the 10th postoperative day, draining less than 40 cc serous liquid/24h each [3]. Five days after discharge she was hospitalized again due to an obvious inflammation of the subumbilical part of the incision. The wound was re-opened and about 500 cc of serous liquid was drained out of a broad cavity between mesh and adipose tissue. Liquid cultures revealed S. epidermidis and E. faecium. Targeted double antibiotic coverage was started immediately following the antibiogram results.

Initially, manual drainage of the seroma and careful wound cleansing was performed twice daily. A simple VAC therapy was initiated at postoperative day 25. Based on the directives a standard dressing was put and remained for 10 continuous days without change. The device was working with non-constant pressure, up to −80 mmHg. The dressing was then removed for 24h, new cultures were sent and it was formed back again until discharge, 25 days in total, with two intermediate dressing changes and repositions. The culture result revealed S. epidermidis alone. Prolonged hospital stay caused excessive stress to our patient, who insisted in getting a discharge for a few days. After non satisfactory outcomes, a mini council of the patient's surgeon and other surgeon's of the clinic was conducted, who decided to change strategy of management and proceed to a new VAC application. She was let go with alginate antimicrobial silver pad (Silvercel-by Systagenix) combined with hydropolymer adhesive foam dressing (Tielle Plus-by Systagenix an Acelity company, San Antonio, TX, USA), with the advice to be changed every 24 hours and return in a week.

Seven days later the patient was re-hospitalized and a negative pressure device -VAC Ulta- (KCI, an Acelity company, San Antonio, TX, USA) with automated solution distribution and removal was applied. In order to optimize the installation therapy, to distribute negative pressure evenly and to achieve even distribution and removal of topical wound solution across the wound, a special VAC VeraFlo Dressing (KCI, an Acelity company, San Antonio, TX, USA) was used. Aiming at the best result, the spiral foam dressing was inserted into the wound with such pressure that its pores could remain free enough. Moreover, a skin protecting drape was placed around the wound edges in order to exert the pressure directly to the subcutaneous wound area and reduce tension on the wound edges on the one hand and secondarily to avoid contact and irritation. At each cycle, saline solution plus hypertonic saline (500 ml NaCl 0,9%: 75 meq NaCl) was instilled at a soak time of 5 minutes and therapy time of 8 hours on a continuous pressure of −125 mmHg. First dressing change performed after 4 days. New bacterial culture was ordered, which resulted negative. On the seventh day the second dressing change was performed. The wound was already half in diameter and depth (Fig. 1). After 15 days in total, therapy was discontinued achieving closure (Table 1). By discharge, the cavity had been closed, the wound had been healed almost completely and no signs of wound inflammation were apparent.

3. Discussion

NPWT, or else known among others as VAC, microdeformational wound therapy (MDWT), topical negative pressure therapy (TNP), subatmospheric wound therapy (SWT) [4] consists a new weapon in management of demanding wound problems that require more than conventional, conservative treatment. The whole VAC system could be analyzed in three main components: a type of sponge that fits the wound size, an adherent dressing, put as an airtight seal over the wound and a device that provides negative pressure to the wound bed and dressing. Special attention should be given to certain parameters such as the pressure power, the sponge type, the use of instillation, the solution used, the structure-geometry of the wound and the frequency of dressing changes.

Referring to the negative pressure, although reported values in the literature range from −75 mmHg to −125 mmHg, it is strongly believed that in cases of highly infected exudates, a pressure of −125 mmHg is most effective [5–7]. In a study with seawater-immersed wound healing in experimental animal models −180 mmHg pressure seems to be optimal [8]. Generally, the maximum pressure that does not cause pain or discomfort to the patient is the desired and the most effective. Moreover, constant pressure appears to be superior to intermediate [1,5,7].

Regarding the dressing changes most researchers recommend changes every 2 or 4 days [7–9]. The most common material used

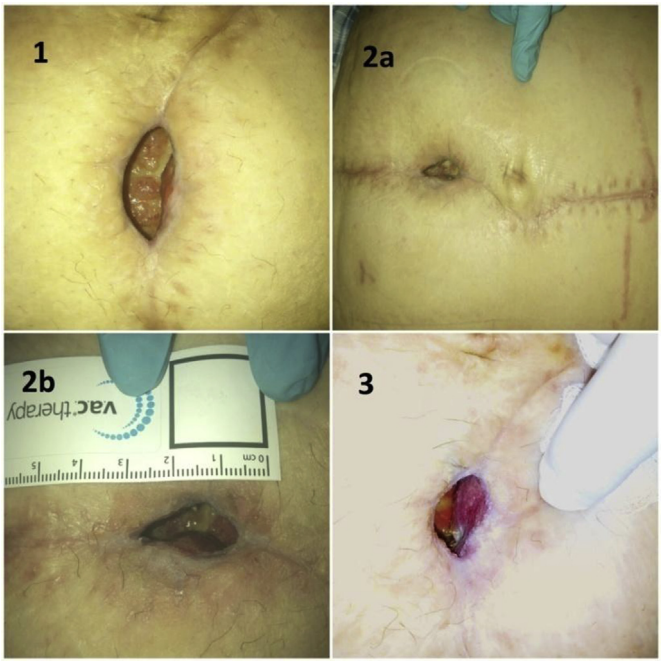

Fig. 1. 1) Wound just before VAC application, 2a-b) Seventh day, significant reduction of wound cavity, 3) After 13 days, the granulation tissue is evident.