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Vacuum assisted closure therapy for poststernotomy mediastinitis: Definitive or bridge to reconstruction



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ABSTRACT

Background: Vacuum assisted closure (VAC) system is used to promote granulation tissue formation and hence, wound healing in chronic difficult wounds when all traditional treatment strategies fail. The idea behind the device was introduced in 1997 which is simply putting the wound under continuous and controlled negative suction pressure inducing arteriolar vasodilation and wound stability.

Methods: 17 patients (with a mean age of 65.8 ± 5.3 years (range 58–79 years) who were diagnosed with poststernotomy mediastinitis after cardiac surgery received VAC system during the course of their treatment. 11 patients [64.7%] underwent coronary artery bypass grafting [CABG], 3 [17.6%] mitral valve replacement [MVR], 2 [11.7%], aortic valve replacement and 1 [5.8%] Bentall operation. Total operative time ranged between 145 and 300 min with a mean of 216.7 ± 45.5 min. 7 [41.1%] patients required exploration for mediastinal bleeding.

Results: Healing by secondary intention was achieved in 7 [41.2%] patients without the need of any further surgery. In 6 [35.3%] patients, primary closure of the wound in layers could be achieved after discontinuation of the VAC therapy. In the remaining 4 [23.5%] patients, the VAC therapy was considered as a bridge to further reconstruction with pectoral muscle flap. Of the group who received pectoral muscle flap, one [5.88%] patient died.

Conclusions: VAC therapy can be considered as good alternative to more aggressive surgery that might not be suitable for some patients during certain times of their treatment course. © 2018 The Egyptian Society of Cardio-thoracic Surgery. Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Median sternotomy is the traditional incision for accessing the heart which was introduced in 1957 by Julian. Since then, lot of reports emerged about wound infections associated with this incision whether superficial, or more aggressive life threatening infections involving the sternum and mediastinum with an incidence of 1–5%. Reported mortality rates ranged between 10 and 20% despite the better quality of antibiotics as well as more sophisticated infection control and wound care techniques [1,2].

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Consequently, treatment of mediastinitis has evolved over time from continuous antibiotic irrigation of the mediastinum using closed tubing system [3] up to more advanced reconstructive techniques using pectoralis muscle flaps [4] and omental flaps [5].

Despite the fact that treatment modalities have improved, mediastinitis is still associated with longer hospital stay, more visits to the operating room, high treatment cost and high mortality rates especially when the first line of management has failed [5–7].

In 1996 and 1997, two different reports introduced the vacuum assisted closure (VAC) system as a modality for treatment of open wounds using negative pressure to enhance granulation tissue formation and wound closure [8,9]. Since then, VAC treatments have been practiced with different types of wounds and lately in treatment of poststernotomy mediastinitis [10].

While these reports have started to evaluate the use of VAC system for the treatment of deep sternal wound infections, more studies are still needed to assess VAC therapy. In this review we describe the results of using VAC therapy on 17 patients with poststernotomy mediastinitis at Ain Shams University hospitals, Egypt.

2. Patients and methods

The present study reviewed all patients at Ain Shams University Hospitals, Egypt who received VAC treatment in the past 2 years either as a definitive therapy for mediastinitis or a bridge to primary closure or reconstructive surgery using pectoralis muscle flap.

17 patients (with a mean age of 65.8 ± 5.3 years (range 58–79 years) who were diagnosed with poststernotomy mediastinitis after cardiac surgery received VAC system during the course of their treatment. 11 patients [64.7%] underwent coronary artery bypass grafting [CABG], 3 [17.6%] mitral valve replacement [MVR], 2 [11.7%], aortic valve replacement and 1 [5.8%] Bentall operation. Total operative time ranged between 145 and 300 min with a mean of 216.7 ± 45.5 min. 7 [41.1%] patients required exploration for mediastinal bleeding. Total Mechanical ventilation hours ranged between 6 and 28 h with a mean of 15.8 ± 6.7 . Detailed patients' characteristics are listed in Table 1.

Our management began with diagnosis of poststernotomy mediastinitis. The wound was carefully assessed for signs of infection and stability of the sternum. Infection was confirmed if serous or seropurulent discharge was observed, in addition to sternal pain, patient's complain of a click with movement whether felt or not on examination, sternal instability, wound dehiscence, and elevated laboratory markers of infection. Time elapsed between primary operation and diagnosis of infection ranged between 11 and 22 days with a mean of 15.8 ± 3.1 . Once diagnosis was confirmed, Imipenem and vancomycin were started and wound cultures were taken. Antibiotics were modified later on when the results of wound culture and sensitivity appeared. The wound was then cleaned and debrided at the bedside. Following initial bed side debridement, 13 patients [76.4%] were considered fit for the VAC therapy while 4 patients [23.6%] required aggressive surgical debridement in the operating room followed by application of VAC system.

VAC sponges were tailored to the size of the sternal wound. Transparent and strongly adhesive sheet was used to cover the sponges and whole wound. The sponges were then connected with a Y piece, and negative suction was applied with a pressure range of 75–125 mm Hg. The VAC dressing was changed every 48 h under aseptic conditions and wound was assessed and photographed to monitor progress. Guidelines for cessation of VAC therapy was either growth of granulation tissue to the skin

Table 1
Detailed patients' characteristics.

	Percent or Mean \pm SD
<i>General Demographics</i>	
Age (years)	65.8 \pm 5.3
Male	70.58%
Body mass index	29.65 \pm 6
Smoking	52.94%
Diabetes	64.7%
Hypertension	76.47%
Chronic obstructive pulmonary Airway Disease	29.4%
Renal failure	17.64%
Grade IIIA mediastinitis	29.5%
Grade IIIB mediastinitis	70.5%
<i>Perioperative Details</i>	
Elective surgery	94.11%
Operative time (minutes)	216.7 \pm 45.5
Resternotomy For Bleeding	41.1%
Total Mechanical ventilation hours	15.8 \pm 6.7
<i>Type of surgery</i>	
Coronary artery bypass grafting	64.7%
Mitral valve replacement	17.6%
Aortic valve replacement	11.7%
Bentall operation	5.8%

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