



## Recurrent *Haemophilus Influenzae* Mediastinitis. Success of a Treatment Combining Redon Drains and Vacuum-Assisted Closure

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### ABSTRACT

Mediastinitis is a dreadful complication after cardiac surgery, in severe forms mortality can reach 50%. The results of the surgery depend on the early management and the surgical technique. Treatment by vacuum-assisted closure -VAC therapy- has shown favorable results.

We report the case of a 69-year-old man with diabetes who underwent triple coronary bypass grafting surgery under extracorporeal circulation. He presented a postoperative mediastinitis treated by closed continuous mediastinal irrigation. The evolution was marked by a recurrence of mediastinitis with a severe form. The patient underwent a surgical revision with placement of closed-drainage aspiration with Redon catheters and vacuum-assisted closure therapy with a good result. The evolution was favorable at the one and three month controls.

Our observation demonstrates the benefit of the association of Redon drains aspiration and VAC therapy in the management of severe mediastinitis after cardiac surgery.

**KEYWORDS:** Mediastinitis, Recurrence, Surgery, VAC-therapy, Case report.

### INTRODUCTION

Post sternotomy mediastinitis (PSM) is one of the most feared complications after cardiac surgery. Its incidence varies between 0.3 and 5% [1-5]. The evolution depends on the early diagnosis and the choice of treatment. But despite a well-conducted treatment, the mortality rate remains high, ranging from 5 to 50% [1-6].

Several surgical techniques have been described. The choice of the optimal technique is difficult in the absence of international recommendations for the management of PSM. Continuous negative pressure therapy or VAC therapy (vacuum-assisted closure therapy) was introduced in 1997 by Argenta and Morykwas [7], and since then it has been widely used and several studies have shown its superiority over other surgical techniques in the management of PSM [1,4,5].

We report the case of an early recurrence of a continuous mediastinal irrigation treatment of an unusual and sensitive mediastinitis causing large local extension. A one-stage treatment with closure of the thorax is made possible by the combination of closed-drainage aspiration with Redon catheters and vacuum-assisted closure therapy.

### CASE REPORT

A report a 69 year old man with a history of hypertension and diabetes mellitus, who had a triple coronary bypass grafting using single internal mammary artery and 2 saphenous veins. The postoperative course was marked by the occurrence of a 1200 ml bleeding with transfusion of two red blood cells. At day 3 postoperatively, he presented bronchitis with expectorant cough, myalgia and nasal discharge. On day 7, the patient presented a sternal wound infection (SWI) with purulent discharge and sternum instability. The C-reactive protein was at 327 mg per liter and the leukocyte counts to 22\*100 cells per microliter, predominantly neutrophils. The biological workup showed leukocytes at 22000/mm<sup>3</sup> and CRP at 320mg/l. The bacteriological study of the pus and blood culture were positive for *Haemophilus influenzae*.

The patient was treated with ciprofloxacin 500mg/12h (MIC = 0.015mg/l) and ceftriaxone 3g/J (MIC = 0.0004mg/l) and early surgical re-exploration with the sitting up of continuous mediastinal irrigation with povidone-iodine solution.

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Ten days later, the patient presented a recurrence of mediastinitis with sternal purulent discharge and extensive skin necrosis (Figure 1,A) associated with sternal dehiscence.

A second surgical revision was decided. On exploration, the infection was deep and extensive. We performed a debridement of necrotic and infected tissue with an abundant antiseptic lavage. Sternal osteosynthesis was performed according to the Robisek technique [8]. A closed-drainage aspiration with 4 Redon catheters was performed. There was a large loss of substance making skin closure impossible (Figure 1,B). We set up a continuous suction system using Vacuum Assisted Closure (VAC) with a pressure of 100 to 125 mmHg. (Figure 2) Intraoperative swabs showed *Haemophilus influenzae*, *Acinetobacter baumannii* and coagulase negative *Staphylococcus*. Antibiotic therapy was changed to a triple combination: Imipenem (1.5g/d), Colimycin (9,000,000 IU/d) and Rifampicine (2g/d).

The clinical and biological evolution was favorable from the 5th day. The Redon drains were removed on the 10th day after three negative cultures. Antibiotics were kept for 6 weeks. The VAC dressings were changed every 3 days. Two weeks later, the evolution was favorable with a good muscular budding (Figure 3,A). A simple skin graft was required for recovery. (Figure 3,B).

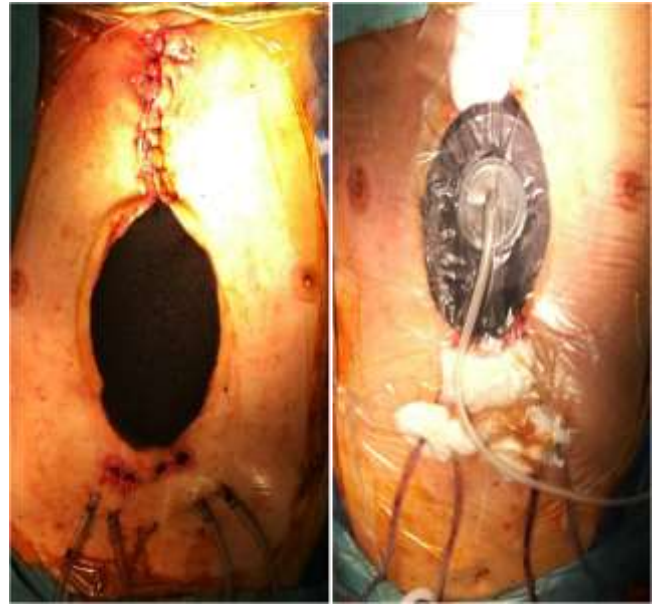
The patient was discharged after a total hospitalization of 45 days. The one and three month check-ups were favorable.

### Figure 1: operative view:

- A: Mediastinitis recurrence with large skin necrosis
- B: large substance loss after surgical debridement.



### Figure 2: Setting up of VAC-system



### Figure 3: final result:

- A: before skin graft
- B: after skin graft



## DISCUSSION

Post sternotomy mediastinitis (PSM) is one of the most dreaded complications after cardiac surgery. Its incidence varies between 0.3 and 5% [1-5]. Failure of surgical treatment is a major determinant of long-term survival. Prevention of early failure depends on early management and choice of the optimal surgical technique. However, in spite of a well-conducted treatment, mortality remains high, varying between 5 and 50% [1-6].

The diagnosis of mediastinitis is based on several criteria: a purulent mediastinal discharge, sternal instability with fever (> 38°C), and a positive culture of a mediastinal swab. The most frequently isolated germ is *Staphylococcus Aureus* (40%) followed by gram-negative bacilli (22%). Polymicrobial mediastinitis can be seen in 10 to 40% of cases [2]. In our case, the diagnosis was easy due to the

sternal instability, the purulent discharge and the positive mediastinal swabs on surgical re-exploration. The germ isolated was *Haemophilus influenzae* (HI), which is rare in this location.

*Haemophilus influenzae* is a gram-negative coccobacillus living in the upper respiratory tract. It can cause many different kinds of infections ranging from mild to serious, like bloodstream infections. Its invasive manifestations, including bacteremia and meningitis, are exceptional. The growth of this germ requires the presence of X (hemin) and V (nicotinamide adenine dinucleotide) factors, which are present in fresh blood [9,10]. The occurrence of immediate postoperative bronchitis may explain why our patient developed bacteremia to this germ and the significant postoperative bleeding constituted a favorable condition for the growth and multiplication of this germ in the mediastinum.

The treatment of PSM is based on excision of infected and necrotic tissues and materials, control of the infection by appropriate antibiotic therapy, and sternal stability by osteosynthesis followed by closure of the supra-sternal walls [2-5]. The choice of surgical technique depends essentially on the intraoperative findings and the condition of the sternal edges and tissues after debridement. Thus, a closed-chest suite can be performed using continuous mediastinal irrigation with povidone-iodine solution or drainage aspiration with Redon catheters. In cases where local damage is significant, a two-stage treatment is required. In the past, some teams used simple packing with continuous irrigation of antiseptic solutions and dressing changes. The results were disappointing [5]. Since 1997, Argenta and Morykwas [8] have described a new technique that has improved the prognosis of PSM, the continuous negative pressure system or VAC therapy. This technique combines the advantages of both closed and open chest techniques [5]. Vacuum-assisted closure has been shown to increase peristernal blood flow by increasing arteriolar dilatation, reduce bacterial load, promote granulation tissue formation, and facilitate approximation of sternal wound edges [2,5].

In our observation, the failure of the continuous mediastinal irrigation is probably related to the unusual of the germ and to a probable mediastinal contamination secondary to the manipulations imposed by this technique. However, in the second revision, the quality of the sternal margins after debridement was acceptable, allowing osteosynthesis using a modified Robiscek technique.

In the 2-stage approach, the VAC-system is placed on an open chest. Thus dressing changes must be done in the operating room under sedation or even general anesthesia. Some authors have reported a number of serious complications such as vascular erosion or even rupture of the right ventricle, especially when the VAC dressing is placed in contact with these structures [11]. All these disadvantages have influenced the choice of the strategy

associating drainage aspiration with Redon catheters and VAC therapy.

This choice allowed us to benefit from the advantages of a closed chest strategy and the VAC-system allowed us to avoid tensioned suprasternal closure that exposed to the risks of disunions and skin necrosis, especially in our patient, where the loss of substance was large. This approach has been used and recommended by several studies [5,12,13].

The comparison of the results of VAC-therapy in the management of PSM with conventional techniques has shown a large benefit in terms of mortality, length of hospital stay and overall cost reduction [1-6]. Another advantage of this technique is the reduction in the use of muscle flap or epiploic covering techniques, which can be complex damaging [2,12].

## CONCLUSION

Our observation and several other studies have suggested the superiority of this single-stage approach in the treatment of this serious complication, which has seen an increase in incidence, despite advances in diagnostic means and improvements in treatment methods. This recrudescence can be explained by the change in the profile of cardiac surgery patients with an increase in the proportion of high-risk patients, hence the importance of prevention.

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