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Case Report

Use of advanced flap and microsurgery techniques in the resolution of mediastinitis as a complication of cardiac surgery

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ABSTRACT

In the majority of cases, mediastinitis is a potential complication in any cardiac surgical procedure. The objective of this case report is to accurately describe how the combination of microsurgery and soft tissue flaps can be an effective therapeutic alternative in the treatment of mediastinitis as a complication of cardiac valve replacement. Female 63-year-old patient with a background of obesity, hypertension and extense cardiac interventions, she was programmed for necrosectomy with left pectoralis flap technique. Mediastinitis, although a rare complication of the sternotomy performed in cardiac surgery, occurring in 1-2%, carries a high mortality rate. Early diagnosis of mediastinitis after cardiac surgery requires high clinical suspicion, initially making the diagnosis may be difficult, risk factors should be considered. An early surgical approach can reduce the morbidity and mortality of this condition. The pectoralis flap should be considered as a safe therapeutic option.

Keywords: Cardiac surgery, Mediastinal abscess, Mediastinitis, Microsurgery, Pectoralis flap, Thorax reconstruction

INTRODUCTION

In most cases, mediastinitis is a potential complication in any cardiac surgical procedure. The infection is primarily caused by Gram-positive cocci, especially coagulase-negative staphylococci or S. aureus, as well as by the Enterobacteriaceae family.[1] Special circumstances, such as esophageal perforation, extension of retropharyngeal abscess, suppurative parotitis, cervical cellulitis or abscess of dental origin, strongly suggest the involvement of anaerobic bacteria.[2]

As median sternotomy is the standard procedure for performing cardiac surgery, common complication that frequently occurs is mediastinitis, especially after myocardial revascularization, and this can have

devastating consequences. Several reports indicate that, the prevalence of mediastinitis after cardiac surgery is as high as 1-2%.[3-5]

This inflammation process occurs most frequently during the first 14 days after the surgery procedure; however the clinical presentation includes a wide variety of symptoms thus an early diagnose is very challenging. Late awareness of this condition carries a high risk of mortality, whereas the presence of a mediastinal abscess represents a define surgical urgency.[6]

Among the several risk factors that can affect this process (Table 1), obesity has a direct correlation to this complication, so the reduction of BMI is strongly suggested to any obese patients before undergoing cardiac surgery.[3] In this case aggressive pre-operative actions should be taken to deal with this risk factor.

Table 1: Risk factors for mediastinitis.

Preoperative risk factors	Postoperative risk factors
Obesity, Diabetes, Chronic obstructive pulmonary disease, Older adults, bad antibiotic prophylaxis, prolonged extracorporeal circulation time, sternal devascularization by use of internal mammary arteries.	Massive blood transfusion

CASE REPORT

Female 63-year-old patient with a background of obesity, hypertension and extense cardiac interventions; aortic balloon valvuloplasty due to double aortic lesion (severe aortic stenosis and mild aortic insufficiency) in 23/05/19, mechanic aortic valve replacement in 28/06/19 and pericardial window secondary to pericardial effusion, in 12/07/19. During the recovery from this last procedure, the patient presented sternal dehiscence with a subsequent mediastinal exploration requiring surgical lavage and sternal wound closing in 16/07/19. During the follow-up surgical lavages and VAC treatments were performed however, the patient did not show improvement, so she was programmed for necrosectomy with left pectoralis flap technique 17/09/19.

Surgical technique

The surgical procedure starts with a wide- section necrosectomy, followed by thorax reconstruction using a pediculated pectoralis flap. The flap must first be excised from all its insertions (clavicular, humeral and parasternal) and taken up towards the mid-line about 6 to 8 centimeters, always controlling the vascular complex (pectoral vein and artery both branches of the thoraco-acromial system). The flap is then fixed to both, medial and parasternal line using Vycril 3-0. Dermal closing is performed in two phases, dermal layer using Monocryl 3-0 and epidermis layer using nylon 3-0.

A double subcutaneous drainage system is implemented for a minimum of 10 days.

DISCUSSION

Mediastinitis, although a rare complication of the sternotomy performed in cardiac surgery, occurs in 1-2%, and often have high mortality rates. Diagnostic criteria include positive bacterial culture from mediastinal tissue or fluid, evidence of mediastinitis on gross anatomic or histopathological examination, and at least one of the following signs or symptoms: fever, chest pain, and sternal instability, with either purulent drainage from the mediastinal area or mediastinal widening on imaging.[7] Minor post-sternotomy defects can be managed with the use of VAC therapy.[8]

Figure 1. A. Thoracic and abdominal defect with chronic infection and fat necrosis, exposure of the mediastinum and large blood vessels is visualized. B. Final result with adequate skin coverage and tension-free closure.

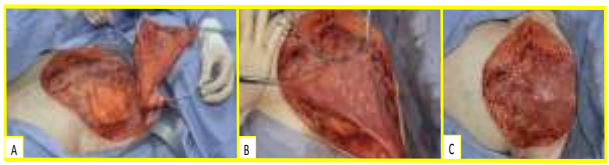

Figure 2. A. Axis of translation of the flap, after its sternal, clavicular and humeral disinsertion. B. Advance of the flap towards the midline, approximately 8 cm translation. C. Fixation of the flap for the reconstruction of the sternal defect.

Mediastinitis is a serious complication of cardiac surgery, which must be diagnosed clinically and treated early with a systemic antibiotic based on the reports of bacterial culture. However, when the infectious process is too advanced and much of the sternal tissue has been compromised, this management is not sufficient. In these cases, an additional surgical treatment with VAC and

subsequent fixation of the chest wall with titanium bars can be performed, once the secretion cultures are negative, which will allow the restoration of the physiology of ventilatory mechanics.[8] Patients treated for mediastinitis are at higher risk of morbidity and mortality than patients who do not experience infectious complications. [9,10]

Although mediastinitis is often related with an infectious component, in most cases death does not occur as a result of uncontrolled infection. A cohort study reporting 5 mediastinitis related defunctions, showed that only two patients hospitalized died as a direct result of infection through multiple organ failure and septic shock, whilst the other three patients died demises from a heart failure, which caused either massive gastrointestinal necrosis or untreatable cerebral lesions.[11]

CONCLUSION

Early diagnosis of mediastinitis after cardiac surgery requires a careful follow up of the patient and although initial diagnosis may be difficult several risk factor should be considered. In this case an early surgical approach can reduce the morbidity and mortality of patients presenting this condition. The pectoral flap should be considered as a safe therapeutic option.

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