



Original article

Resternal closure versus pectoral muscle flap following omental flap in treatment of deep sternal wound infection

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Abstract

Background: Mediastinitis after cardiac surgery is defined as the infection of organs and spaces of the mediastinum, which may occur in 0.4%–2.4% of cases. When this complication occurs, it increases the length of hospital stay and hospital costs, besides being possibly lethal. Mortality can vary between 10% and 47%. Risk factors for mediastinitis includes: Uncontrolled diabetes, Obesity, Mammary harvesting, Prolonged ventilation, COPD, Massive blood transfusion and Osteoporosis.

Methods: This study is a prospective study. It included 40 CABG patients between January 2012 to June 2014 in Cardiothoracic Surgery department, Faculty of Medicine, Cairo University. All patients underwent surgical debridement of necrotic and infected tissues and the removal of sternal wires followed by omental flap under general anesthesia. The patients were divided into two study groups: The first group (Resternal closure group) included 20 patients for whom the sternum was closed by wires. The second group (Pectoral muscle flap group) included 20 patients for whom the sternum was not closed and bilateral pectoral muscle flaps were done.

Results: Patients in both groups were evaluated for postoperative extubation from mechanical ventilation, and mediastinitis for one month after surgery. In the first group (Resternal closure) 10 patients (50%) were extubated immediately postoperatively and 2 patients had deep sternal wound infection (DSWI) (10%) and died because of septicemia. In the second group (pectoral muscle flap), 8 patients (40%) were extubated immediately postoperatively and 1 patients (5%) has DSWI and died because of septicemia.

Regarding early extubation immediately postoperatively and reinfection with DSWI with septic shock and mortality, there was no statistically significant difference between both groups.

Conclusion: Omental flap is safe, easy and effective technique in management of mediastinitis with DSWI following open heart surgery in CABG patients either this procedure was followed by reclosure of the sternum or bilateral pectoral flap. However, reclosure of the sternum is more physiological and less invasive than doing bilateral pectoral flap leaving the sternum unclosed.

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Keywords: Chest wall; DSWI; Mediastinitis; Omental flap

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1. Introduction

Mediastinitis, or deep sternal wound infection, is a feared life-threatening complication of cardiac surgery involving a midline sternotomy, with in-hospital mortality rate as high as 47%. Treatment of sternal wounds complicated by mediastinitis involves debriding the affected sternum with partial or total sternectomy followed by immediate or delayed closure [1,2].

Sternal debridement requires removal of all nonviable and infected soft tissues; the entire affected sternal fragments, the sternal wires, and other foreign materials. It is essential to perform careful debridement to avoid injuring vital structures. In complete sternectomy, the avascular costal cartilages are a potential source for infection and should be removed [3].

Options for reconstruction of sternal wounds include: a unilateral pectoralis major muscle “turnover” flap, unilateral or bilateral pectoralis major muscle or myocutaneous advancement flap, rectus abdominis muscle or myocutaneous flap, latissimus dorsi muscle or myocutaneous pedicled or microvascular flap, omental flap, or a combination of these. Use of one or more pectoralis flaps is generally the first line for reconstruction of sternal wounds [4–6].

The omental transposition flap has been shown to be effective in sternal wound reconstruction, especially in irregular defects or when muscle flaps have failed [2]. Omental flaps transposed through the diaphragm are advantageous because of their robust blood supply, relatively long vascular pedicle enabling transfer to the anterior mediastinum, bulk, ability to cover irregular defects, and provision of lymphocytes and angiogenic factors [3,7]. A problem with omental flaps is the potential for patchy fat necrosis.

The aim of this work was to study and to compare effectiveness of resternal closure versus pectoral muscle flap in patients with deep sternal wound infection (DSWI) managed by omental flap [8,9].

2. Patients and methods

This prospective study was done between January 2012 to June 2014 in Cardiothoracic Surgery Department, Cairo University. 40 patients underwent omental flap as a treatment for deep mediastinitis following open heart surgery (CABG). These patients were divided into 2 groups:

- First group (Resternal closure): All patients underwent omental flap after proper debridement of the necrotic tissues followed by sternal closure using wires. This group included 20 patients with age range from 50 years to 70 years (mean 61) and 12 of them were females (60%) and 8 patients were males (40%).
- Second group (Bilateral pectoral muscle flap): All patients underwent omental flap after proper debridement of the necrotic tissues followed by bilateral pectoral muscle flap while the sternum was left unclosed. This group included 20 patients with age range from 48 years to 68 years (mean 60) and 13 of them were females (65%) and 7 of them were males (35%).

2.1. Preoperative preparation

- 1- All patients in both groups had a culture and sensitivity from sternal wound discharge and they received antibiotic according to culture result for at least 4 days before going to surgery.
- 2- Tight glycemic control using sliding scale maintaining blood sugar level not exceeding 180 mg/dl.
- 3- Improving the general condition by blood transfusion, fresh frozen plasma and albumin infusion.

2.2. Operative technique

Under general anesthesia, the sternal wound was reopened. All stitches and wires were removed. Proper debridement was done, removing all infected sternal tissues.

Through a small incision in the diaphragm, a pedicled omental flap was brought up from the abdomen to the sternal wound and then the omental flap was used to fill the space of the sternal wound (Figs. 1 and 2).

In the first group of patients, the sternum was closed using stainless steel wires size 5 in interlocking figure of 8 sutures followed by closure of the subcutaneous tissues and skin with interrupted sutures.

In the second group of patients, the sternum was left open. Pectoralis major muscles in both sides were properly released from the underlying ribs and overlying skin and subcutaneous tissues. Both pectoral flaps were sutured in the middle line over the omental flap using interrupted sutures followed by closure of subcutaneous tissues and skin using interrupted sutures.

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