

A Retrospective Multicenter Experience: Does Packing the Surgical Field Help to Stop Bleeding After Cardiac Surgery

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ABSTRACT

Background: Intractable bleeding after cardiac surgery is a well-documented complication. When conservative measures fail to control bleeding, re-exploration is required, and, in some cases, chest packing may be needed.

Methods: The study included 148 patients admitted to eight cardiac surgery centers in Egypt with severe postoperative bleeding. All patients underwent chest re-exploration and chest packing to control postoperative bleeding.

Results: The mean age was 62.7 ± 5.6 years. Their mean BMI was 27.1 ± 3.9 kg/m². One-hundred-ten (74.3%) of included patients were hypertensive, while 49 (33.1%) patients were diabetic. Twenty-seven (18.2%) patients had initially had a triple valve replacement. Sepsis was prevalent among 31 (20.9%) of included patients. Twenty (13.5%) patients died.

Conclusion: Intractable bleeding is a well-documented complication following cardiac surgery. Chest re-exploration is required in certain situations when the traditional conservative options fail to stop bleeding. Chest packing is a modality that can be considered to control bleeding in certain situations.

INTRODUCTION

Postoperative bleeding is a well-documented complication after cardiac surgery worldwide. It is estimated that 2–11% of cardiac surgery patients experience excessive bleeding [Dyke 2014]. Many risk factors were found to be strongly associated with bleeding, such as low hemoglobin levels, prolonged antiplatelet drug therapy, platelet dysfunction, and prolonged uncontrolled diabetes [Fröjd 2016].

Unfortunately, uncontrolled bleeding can lead to many negative consequences and mortality. Fröjd et al. reported that postoperative bleeding was found to be associated with a twofold increase in postoperative mortality [Fröjd 2016]. In addition, perioperative blood transfusion in cardiac patients

can predispose to increased morbidity and decreased long-term survival [Murphy 2007].

Sometimes the bleeding is severe and requires re-exploration. Biancari et al. performed a systematic review to test the efficacy of re-exploration to control postoperative bleeding and reported that the risk of immediate postoperative mortality was significantly increased among those patients and also reported an increased risk for prolonged postoperative mechanical ventilation and stroke among those patients.

Some authors recommended that temporary packing can successfully stop the bleeding source [Thomas 2005].

This retrospective multi-center study aimed to answer whether packing the surgical field helps stop bleeding after cardiac surgery.

MATERIALS AND METHODS

This retrospective multicenter study was performed in eight centers in Egypt between January 2014 to December 2021 and included 148 patients, who underwent chest re-exploration and packing for intractable bleeding after cardiac surgery.

The decision to perform re-exploration was the responsibility of the operating surgeon; it was derived based on the combination of the hemodynamic status of the patient, bleeding rate, and echocardiographic findings.

The following demographic characteristics were collected: sex, age, BMI, associated comorbidities, and original surgical procedure. The packs were put around the heart in varying numbers to stop bleeding. The sternum was approximated using only skin sutures.

Definitive closure was done after the removal of the packs the next day.

Postoperative complications, such as postoperative wound infection, sepsis, and mortality rate, were recorded.

Statistical analysis: Data was collected and analyzed using Microsoft Excel. Results were statistically represented, in terms of range, mean, standard deviation, and percentage.

RESULTS

The mean age was 62.7 ± 5.6 years old. The average BMI was 27.1 ± 3.9 kg/m². Of the total number of patients, 74.3% (110 patients) were hypertensive, while DM was prevalent in 33.1% (49 patients). (Table 2)

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Table 1. Cardiac centers that participated in the study

Hospital category	City	Hospital name
University	Cairo	Ain Shams University Hospital (Cardiac Academy)
University	Cairo	Ain Shams University Specialized Hospital
Military	Cairo	Air Force Specialized Hospital
Private	Menofia	Elaraby Hospital
Private	Cairo	Dar Al Fouad Hospital
Private	Cairo	El Borg Hospital
University	Cairo	Al Azhar
Governmental	Giza	6th of October Insurance Hospital

Table 2. Demographic characteristics of patients (N = 148)

Variable	N (%)
Age (years)	62.7±5.6
BMI (kg/m2)	27.1 ± 3.9
Hypertension	110 (74.3)
Diabetes mellitus	49 (33.1)

BMI, body mass index

Sternal wound infection occurred in 16 patients (10.8%). Sepsis happened in 31 patients (20.9%). Twenty patients (13.5%) died. (Table 4)

DISCUSSION

It is known that advanced age is an associated risk factor for the increased incidence of the need for chest re-exploration among patients undergoing open heart surgeries. In our study, the mean age of patients was 62.7±5.6 years. This matches what was reported by Heimisdottir et al., who retrospectively reviewed more than 48,000 patients undergoing cardiac surgeries, either CABG or valve replacement, in the period between 2006 and 2015 [Heimisdottir 2022].

They also performed a Cox regression analysis to identify the associated risk factors for chest re-exploration. They reported that only 4.9% of patients needed re-exploration among included patients and that advanced age was significantly associated with an increased exploration rate among patients [Heimisdottir 2022].

We tested the outcome of chest packing during cardiac re-exploration and its effect on postoperative mortalities among included patients. The mortality rate in our patients was 13.5% (20 patients). Our findings were similar to what was reported by Charalambous et al., who reviewed the medical records of 6890 patients admitted at Manchester Royal Infirmary hospital for open heart surgeries for nine years. They reported that only 20 patients required chest packing

for uncontrolled bleeding, and the mortality rate was 15% of included patients [Charalambous 2002].

The original procedure performed	N (%)
Triple valve replacement	27 (18.2%)
Double valve replacement and CABG	24 (16.2%)
AVR and ascending aortic aneurysm repair	19 (12.8%)
Redo DVR	16 (10.8%)
AVR and CABG	11 (7.4%)
Bentall procedure	11 (7.4%)
Redo AVR and aortic root abscess repair	10 (6.8%)
MVR and CABG	10 (6.8%)
CABG	8 (5.4%)
Redo MVR	7 (4.7%)
Type A aortic dissection repair	5 (3.4%)

Table 3. The original procedures performed (N = 148). Most of the patients included in the study were elective 109 (73.6%), 28 patients (18.9%) had urgent procedures, and 11 patients (7.4%) underwent emergency operations.

Complications	N (%)
Sternal wound infection	16 (10.8%)
Sepsis	31 (20.9%)
Mortality	20 (13.5%)

for uncontrolled bleeding, and the mortality rate was 15% of included patients [Charalambous 2002].

Another recent study was conducted by Islam et al. in 2021. They tried to identify the outcome of patients undergoing chest re-exploration to control postoperative cardiac bleeding. They recorded no mortality, as they adapted early re-exploration without the need to wait as long as they developed moderate bleeding. This, in turn, improved the outcome of included patients [Islam 2021].

It is known that postoperative bleeding is one of the most typical complications following cardiac surgery. This may be due to factors, such as elevated levels of heparin activity, hypothermia, impaired platelet functions, and increased fibrinolytic activity. All of these contribute to increased blood loss during or after the procedure [Ranucci 2013].

Most of the patients included in the study were elective 109 (73.6%), 28 patients (18.9%) had urgent procedures, and 11 patients (7.4%) underwent emergency operations. Kinduris et al. 2006 reported that using antiaggregants and anticoagulants before surgery increases the incidence of re-sternotomies in the early postoperative period [Kinduris 2006].

Sternal wound infection occurred in 16 patients (10.8%), which is less compared to what was reported by Bouboulis et al. who reported 24% of sternal wound infections for patients who were managed by surgical field packing for severe bleeding after cardiac surgery [Bouboulis 1994].

Postoperative bleeding often is assessed by the volume of packed red blood cells (PRBCs) that are transfused. Because of this, the quantification depends on the transfusion strategy, which includes the threshold for PRBCs transfusion, which differs from one center to another [Karkouti 2007].

In 2014, an international expert group used reliable parameters for the definition of postoperative bleeding after cardiac surgery, collectively known as the Universal Definition of Perioperative Bleeding (UDPB). One of those parameters was the volume collected from the chest tube drainage over the first 12 hours after adult cardiac surgery. Combined with the other eight variables, that group successfully classified the bleeding into four levels – mild, moderate, severe, and life-threatening [Fröjd 2016].

In most cases, bleeding can be corrected by correcting associated hematological abnormalities and re-exploration to control bleeding sources or remove clots around the heart. However, certain cases require additional efforts to stop bleeding, such as chest packing.

In 2021, Elassal et al. performed a retrospective analysis of adult patients who underwent cardiac re-exploration in a trial to control postoperative bleeding. They reported 565 adult patients underwent re-exploration for postoperative uncontrolled bleeding between February 2006 and May 2019 [Elassal 2021].

Limitations: The limitations of our study are its retrospective nature and the number of cases being relatively small.

CONCLUSION

Intractable bleeding is a well-documented complication following cardiac surgery. Chest re-exploration is required in

certain situations when the traditional conservational options fail to stop bleeding. Chest packing is a modality that can be considered to control bleeding in certain situations.

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