PREDICTORS OF RE-EXPLORATION FOR BLEEDING AFTER CORONARY ARTERY BYPASS GRAFT AND VALVE SURGERY

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ABSTRACT

Background

A significant number of patients undergoing cardiac surgery require re-exploration for postoperative bleeding.

Objectives

The aim of this study is to find out the predictors of re-exploration for such bleeding.

Patients and Methods

Over a 5-year period (January 2010-December 2014) 1,565 patients underwent open-heart surgery in Slemani Cardiac Hospital, Sulaimaniyah, Iraq. Fifty seven patients (3.6%) were identified as having a significant bleeding after coronary artery bypass graft (CABG) and/or valve operations requiring urgent exploration within few hours. The medical records of these patients were retrospectively reviewed.

Results

There were 36 males and 21 females. The mean age was 61.8±7.5 years. The majority of patients had CABG (n=41, 71.9%) while the remainder 16 patients (28.1%) had valve operations. The mean time interval between the primary cardiac operation and re-exploration was 3.17 ± 1.5 hours. Twenty nine patients (50.9%) had a drop in hemoglobin level. Thirteen patients (22.8%) had a fall in arterial blood pressure (ABP) ± raised central venous pressure (CVP). CVP was elevated in 9 patients (15.8%). The mediastinum was widened on chest radiograph in 4 occasions (10.5%). More than half of the patients (n=32, 56.1%) had arterial hemorrhage. The earliest re-exploration was required for arterial bleeding while bleeding of unknown origin was the latest to be re-explored. Decreased ABP and massive blood drainage were associated with early re-exploration, while radiological evidence of widened mediastinum and decreased Hb level were linked to late re-exploration.

Conclusion

A drop in ABP and massive blood drainage seem to be good predictors for exploration.

Keywords: *Cardiac surgery, Coronary artery bypass graft, Re-exploration.*

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INTRODUCTION

Bleeding following cardiac surgery is common. Re-exploration for severe bleeding after coronary artery bypass grafting (CABG) and valve surgery is reported to be necessary in 5%-9% of cases [1, 2]. Such bleeding would increase the morbidity and mortality by 2-3 times [1]. The underlying causes include the preoperative use of anti-platelets or anti-coagulant drugs, consumption coagulopathy, increased fibrinolysis and surgery-related factors [3-6]. Early detection of this complication requires a close patient monitoring and attention to certain predictors. There is a plenty of literature about factors which serve as helpful predictors for early detection and timely treatment of this serious complication [7-12].

The aim of this study is to find out some predictors of re-exploration for bleeding post-CABG and valve surgery in Sulaimaniyah, Iraq with a literature review.

PATIENTS AND METHODS

Over a 5-year period (January 2010-December 2014) 1,565 patients underwent open-heart surgery in Slemani Cardiac Hospital (SCH) for different indications namely (41 cases of CABG) and (16 cases of valve surgeries) other cases like congenital heart diseases and aortic surgeries were not included in this study. Fifty seven patients (3.6%) were identified having a significant bleeding after CABG and/or valve operations requiring urgent exploration within a few hours. The medical records of these patients were retrospectively reviewed.

RESULTS

There were 36 males (63.2%) and 21 females (36.8%). The mean age was 61.8 ± 7.5 years. The majority of patients had CABG (n=41, 71.9%) while the remainder 16 patients (28.1%) had valve operations. The mean time interval between the primary cardiac operation and re-exploration was 3.17 ± 1.5 hours.

About one half of the patients (n=29, 50.9%) had a drop in Hb level. Thirteen patients (22.8%) had a fall in arterial BP with or without raised CVP. CVP was elevated in 9 patients (15.8%). The mediastinum was widened on chest radiograph in 4 occasions (10.5%).

Re-exploration recognized the sources of bleeding as either arterial, venous, diffuse ooze or unknown, Table 2.

More than half of the patients (n=32, 56.1%) had arterial hemorrhage. CABG was more frequently associated with bleeding than valve surgery.

The time interval between the primary cardiac operation and re-exploration according to the source of bleeding is shown in Table 3.

The earliest re-exploration was required for arterial bleeding, while bleeding of unknown origin was the latest to be re-explored. The diffuse ooze was also re-explored late as compared to arterial and venous bleedings. Moreover, it seems that decreased arterial BP and massive blood drainage were associated with early re-exploration, while radiological evidence of widened mediastinum and decreased Hb level were linked to late re-exploration.

Table 1. The changes in hemodynamic status observed in this series.

Variable	Number of patients	%
Drop in Hb level	29	50.9
Continuous or massive blood drainage	9	15.8
Decreased arterial BP+ increased CVP	9	15.8
Widened mediastinum on chest radiograph	6	10.5
Decreased arterial BP alone	4	7

Table 2. Sources of bleeding vs. type of surgery

Source of Bleeding	Number of cases	Types of operations		P value
		CABG	Valve Surgery	
Arterial	32	25 (78.1%)	7 (21.9%)	0.692
Venous	11	7 (63.6%)	4 (36.4%)	
Diffuse	9	6 (66.7%)	3 (33.3%)	
Unknown	5	3 (60.0%)	2 (40.0%)	
Total	57	41 (71.9%)	16 (28.1%)	

Table 3. Time before exploration vs. bleeding source and other variables.

Bleeding source	Time before exploration (hours)	P value
Arterial	2.96±1.75	0.504
Venous	3.18±1.25	
Diffuse	3.44±1.13	
Unknown	4.00±0.00	
Other variables		
Decreased arterial BP	1.00±0.00	<0.001
Massive blood loss	1.00±0.00	
Decreased arterial BP and inecreased CVP	2.44±0.88	
Widened mediastinum	4.00±0.89	
Decreased Hb level	4.20±0.72	

DISCUSSION

This study was conducted to find out the percentage of patients who necessitate re-exploration soon after CABG and valve surgery, the factors which accurately predict such patients and the proper timing of re-exploration. Intervention in the proper time would save many lives; which could otherwise be lost due to ongoing bleeding.

The percentage of re-exploratory surgery for post-operative bleeding in this study was 3.6%; this falls within the internationally reported range of (3.6%-6%) [12, 13]. CABG operation far exceeded valve surgery in this series (41 vs. 16). This may reflect the increased incidence of coronary artery disease among our population. A similar situation is found in the western countries in which rheumatic heart disease has become a rarity due to improved socioeconomic conditions [6, 7, 14]. On average, re-exploration was done at a mean time of 3-4 hour after the index operation. Arterial bleeding required re-exploration significantly earlier than venous or diffuse bleeding. In other studies, postoperative bleeding was more frequently caused by surgical faults than by coagulopathies. However, coagulopathy was more severe and dismal than surgical bleeding [15, 16].

In the present study, decreased arterial BP and massive blood drainage were associated with early re-exploration, while radiological evidence of widened mediastinum and decreased Hb level were linked to late re-exploration. The literature described many other predictors of re-exploration such as transfusion of red blood cell, fresh frozen plasma, platelet or cryoprecipitate, surgical faults, low ejection fraction, high EuroSCORE, operations other than CABG, low

body mass index, diabetes mellitus and preoperatively elevated serum creatinine [10, 11, 12, 16]. A meticulous surgical technique is crucial to decrease the rate of postoperative bleeding [12].

In summary, CABG was more associated with postoperative bleeding than valve surgery. Arterial hemorrhage exceeded other types and required earlier exploration compared to other varieties. Decreased arterial blood pressure, continuous or massive blood drainage, a drop in Hb level and radiological evidence of widened mediastinum were predictors of the need for re-exploration in a descending order.

Conflict of interest

None to be declared.

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