

The Outcomes of Re-Exploration for Bleeding Following Coronary Artery Bypass Grafting (CABG)

SHAZIA NAZIR¹, HUMAIRA BATOOL², SYEDA TASNEEM KAUSAR³, RUBINA JABEEN⁴

^{1,2}Post RN, Nursing Department, Superior University Lahore

³Director, Nursing Department, Superior University Lahore

⁴Principal, Nursing Department, Superior University Lahore

Correspondence to: Shazia Nazir, Email: shazianazir51@gmail.com, Cell: 0092300-4936895

ABSTRACT

Objectives: The main objective of study was to explore the effect of re-exploration after coronary artery bypass (CABG).

Material and Methods: This was descriptive cross sectional study conducted at cardiac surgery department during the period of 1st January to 30th June, 2017. A pre design questionnaire was used to collect data on outcomes of all re-explored cases for post-operative bleeding that underwent CABG surgery. The data was analyzed by SPSS 20. Statistical test like chi-square test was applied to obtain the required results.

Results: Findings of current study showed that the average age of patient was 38.2±4.2 years (age range 21-50 years). The male and female participants were 38(66%) and 20(34%), Low output syndrome 9(16%), IABP Support 5(9%), Arrhythmias 11(19%), Post-operative lung dysfunction 6(10%) and 3(9%) Stroke.

Conclusion: Delay in re-exploration and massive amount of allergenic blood products are associated with a worse clinical outcome and an increase in mortality.

Keywords: Re-exploration, Coronary Artery Bypass Grafting (CABG), intra-aortic balloon pump (IABP)

INTRODUCTION

Re-opening after surgery due to postoperative bleeding still seems to be very common and it's often followed by several complications that wrecked the postoperative outcome and increase death. People who underwent surgical re-exploration have a significant risk of serious complications (low cardiac output, stroke, renal failure, longer ventilators, infections, and a longer stay in the ICU/hospital).⁽¹⁻²⁾

"Re-exploration for bleeding following CABG was related to lower results than those who did not have this experience." Chronic stroke (2.2-fold), bronchitis (2.9-fold), sepsis (4.3-fold), the need for prolonged breathing (48 hours; 4.6-fold) were all higher common in those who underwent re-exploration. Patients who required re-exploration for hemorrhage had a 4.5-fold increase in postoperative death. Increased morbidity as a consequence of re-exploration may result in longer intensive care and hospital stays, putting a substantial financial strain on the patient, which is especially important in third-world nations.⁽³⁻⁵⁾

The consultant surgeon usually makes the decision to re-explore for postoperative bleeding. The decision regarding re-exploration dependence on excessive bleeding or tamponade and surgeon's preferences, however, Kirkland and Barratt-re-exploration Boyce's criteria protocol usual practice.⁽⁶⁾

Over the last decade, there have been different innovative trends in cardiac surgery introduced and many of these are techniques have beneficial effect for the management of re-exploration after CABG. Preoperative usage of aspirin, clopidogrel, and anti-fibrinolytic medicines are likely to alter the patient's hematological report following CABG, according to current trends.⁽⁷⁾ CABG procedure is more recommended for older, very sick, and more unstable patients those are using heparin infusion may lead to a high rate of re-exploration for excessive bleeding.⁽⁸⁾

In new clinical practices in cardiac surgery re-evaluated for re-exploration due to bleeding after cardiac surgery. Excessive bleeding after surgery is linked to an increased risk of complication and death. Despite the fact that hypovolemia should be treated with plasma expander volume infusions, postoperative excessive bleeding causes hemodynamic instability and is associated to the degree and type of bleeding as well as intensive fluid replacement. To treat anemia and coagulopathy and maintain normovolemia, multiple blood products must be transfused.

Due to high risk of infection and renal failure, blood transfusions can increase intra-operative and postoperative death. Blood transfusions are high in vasoactive cytokines and haematocrit, which is useless at oxygen transport, resulting in severe respiratory dysfunction and contributing to prolonged

mechanical ventilation time, anaphylactic blood transfusion reactions, right heart failure, and blood transfusion-related infection.⁽⁹⁻¹⁰⁾

Most significantly, blood collection in the pericardial cavity can cause cardiac tamponade, which caused severe hemodynamic disorientation and worsens cardiopulmonary arrest. A median sternotomy incision is made in CABG patients, and pericardial drains are placed before the wound is closed. Pleural tubes are placed if pleural gaps are opened. Chest tubes of 32F and 34F are commonly used. When the patient arrives in the ICU, a suction drainage system with 20 cm of H₂O suction is immediately linked to chest drains. To preserve patency, chest drains are gently removed. Although some surgeons do not implant chest drains within the pleura gaps, any bleeding that occurs in the pleura is collected and will not be drained by the pericardial drain.

MATERIAL AND METHODS

The current study was descriptive cross-sectional study. A pre design questionnaire was used to collect data to evaluate the outcomes of Re-exploration for bleeding following coronary artery Bypass. The multiple rounds of data collection were done. After taking an approval from hospital principles committee, all re-explored cases for post-operative bleeding that undertake CABG (elective / emergency) surgery will be enrolled based on inclusion & exclusion criteria all through non-probability sampling using suitable technique. Data taken from cardiothoracic surgery unit at PIC Lahore and informed consent was taken before surgery from all the patients satisfying the inclusion criteria.

RESULT

Findings of current study showed that the average age of patient was 38.2±4.2 years with age range 21-50 years. The male participants were 38(66%) as compare with female participants was 20(34%). The data showed that patients of hypertension 46(79%), Diabetes Mellitus 31(54%), Obesity 27(47%), family history of IHD and renal failure 36(62 %) and 12(21%) respectively. Current study illustrate findings as low output syndrome 9(16%), IABP support 5(9%), arrhythmias 11(19%), p-operative lung dysfunction 6(10%) and 3(9%) stroke. **(Table. 1)**

Statement taken from nursing student regarding re-exploration after CABG, they agreed that hypertension 75(51%), obesity 58(39%), surgical negligence 58(39%), tamponade 61(41%) and over age patients 54(37%) but they were neutral regarding over burden was main cause of re-opening after CABG. **(Table. 2)**

Findings of current study mostly agree nursing instructor agreed that infection 67(46%), improper ligation 62(43%), prolonged cardiopulmonary bypass time 58(40%) and re exploration due to liver disease were factors contributing for re-exploration after CABG (Table. 3)

Table 1: Demographic Information of Research Participants

Sr. No.	Variables	Frequency %	
1.	Mean Age in years (38.2±4.2)		
	21-30	14(24%)	
	31-40	25(43%)	
	41-50	19(33%)	
2.	Gender		
	Male	38	66
	Female	20	34
3.	Risk Stratification	Yes	No
	Hypertension	46(79%)	12(21%)
	Diabetes Mellitus	31(54%)	27(46 %)
	Obesity	27(47 %)	31(53 %)
	Family History of IHD	36(62 %)	22(38 %)
	Family History of Renal Failure	12(21%)	46(79 %)
4.	Outcomes	Yes	No
	Low output syndrome	9(16%)	49(84%)
	IABP Support	5(9%)	53(91%)
	Arrhythmias	11(19%)	47(81%)
	Post-operative Lung Dysfunction	6(10%)	52(90%)
	Stroke	3(9%)	55(91%)

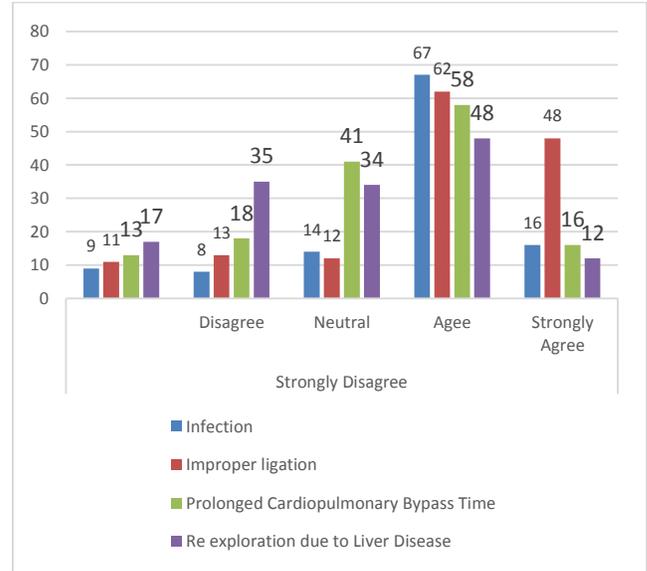


Table 2: Qualities of Effective Nursing Instructor Being Actually Encountered by the Students

Statements	Strongly Disagree	Disagree	Neutral	Agee	Strongly Agree
Bleeding due to hypertension cause re-exploration	16(11%)	3(2%)	9(6%)	75(51%)	43(30%)
Obese patients are more prone to re-exploration after CABG	16(11%)	17(12%)	39(27%)	58(39%)	16(11%)
Re-exploration after CABG is due to some surgical negligence	8(5%)	16(11%)	24(16%)	58(39%)	40(27%)
Tamponade causes re-exploration after CABG	14(10%)	10(8%)	22(15%)	61(41%)	39(28%)
Over burden of patients can cause re-exploration	9(6%)	43(29%)	45(31%)	38(26%)	11(8%)
Old age patients are more prone to re-exploration	6(4%)	32(22%)	45(31%)	54(37%)	9(6%)

Table 3: Contributing Factors for Re-exploration after CABG

Research Variables	Strongly Disagree	Disagree	Neutral	Agee	Strongly Agree
Infection	9(6%)	8(5%)	14(10%)	67(46%)	16(11%)
Improper ligation	11(8%)	13(9%)	12(8%)	62(43%)	48(32%)
Prolonged Cardiopulmonary Bypass Time	13(9%)	18(12%)	41(28%)	58(40%)	16(11%)
Re exploration due to Liver Disease	17(12%)	35(24%)	34(23%)	48(33%)	12(8%)

DISCUSSION

This is a descriptive cross-sectional research study from single institute with small size of patients on reexploration for bleeding after heart surgery. The aimed of current studyto explore the outcomes of re-exploration for bleeding following coronary artery bypass grafting (CABG).

The finds of current study showed that the average age of patient was 38.2±4.2 years with age range 21-50 years. The male participants were 38(66%) as compare with female participants was 20(34%). According to risk stratification, hypertensive patients was 46(79%), Diabetes Mellitus 31(54%), Obesity 27(47%), Family History of IHD and renal failure 36(62 %) and 12(21%) respectively. Findings showed outcomes of study as Low output syndrome 9(16%), IABP Support 5(9%), Arrhythmias 11(19%), Post-operative lung dysfunction 6(10%) and 3(9%) Stroke

Elassalet. al (2021) conducted a research on re-exploration for bleeding after cardiac surgery: reevaluation of urgency and factors promoting low rate. They enrolled 565 patients and divided into three groups, the age (median) was 51.0± 0.5. The data showed male and female patients were 432(76%) and 133(24%). The hypertensive patient 280(50%), Diabetes Mellitus were 293(52%), smoker patients 206(37%) and Chronic lung disease 53(10%).⁽¹³⁾ These findings supported current study.

Peric et. al (2015) conducted a study, total of 243 patients were divided into four examined groups (<50, 50–59, 60–69 and ≥70 years), according to their age. They enrolled 181(80%) male and 45(20%) females, regarding risk factors, they observed that

157(72%) patients were hypertensive, 102(45%) were smoker, Diabetes mellitus 45(20%) Obesity found in 59(26%). (14%)

A self-administrated and modified questionnaire was used to collect the information. Total 146 nurse interviewed under direct supervision of principal investigator. According to their statement regarding re-exploration after CABG, they agreed that hypertension 75(51%), obesity 58(39%), surgical negligence 58(39%), Tamponade 61(41%) and over age patients 54(37%) but they were neutral regarding over burden was main cause of re-opening after CABG.

Al-Attar et. al (2019) explored that bleeding after cardiac surgery. They included 3963 CABG patients; and found incidences of in-hospital bleeding complications and reoperation for bleeding were 6.7 and 0.3%, respectively. They illustrated their results that the median patient age was 70 years; 72% were male. Twenty-three percent of patients had a history of myocardial infarction; 24% had congestive heart failure; 20% had chronic pulmonary disease; 25% had diabetes, 13% had renal disease, and 4% had anemia. Use of antiplatelet medications (60%) and oral anti-coagulant drugs (13%) during the pre-index baseline period was common.⁽¹⁵⁾

CONCLUSION

Delay in re-exploration and massive amount of blood products are associate with a worse clinical outcome and an increase in mortality.

Recommendation: It is strongly recommended that improvement of preoperative care, surgical technique and policy of early re-exploration for bleeding as it does not seem to add the risk and cause is usually found.

REFERENCES

1. Ranucci, Giuseppe Bozzetti, Antonio Ditta, Mauro Cotza, Giovanni Carboni and Andrea Ballotta, 2008. Surgical Re-exploration after Cardiac Operations: Why a worse Outcome? *Ann ThoracSurg*, 86 (2008):1557— 1562.
2. Rajendra H. Mehta, Shubin Sheng, Sean M. O'Brien, Frederick L. Grover, James S.Gammie, T. Bruce Ferguson, Eric D. Peterson, 2009. Reoperation for Bleeding inPatients Undergoing Coronary Artery Bypass Surgery Incidence, Risk Factors, TimeTrends, and Outcomes. *Journal of the American Heart Association*, 2 (2009):583-590.
3. Diana Reser, Hector Rodríguez CetinaBieffer, André Plass, Christian Ruef, BurkhardtSeifert, Dominique Bettex, PatrieBiaggi, Volkmar Falk, and Sacha P. Salzberg, 2012.Incidence of Sternal Wound Infection after Re-exploration in the Intensive Care UnitAnd the Use of Local Gentamycin. *Ann ThoracSurg* .94(2012):2033—2037.
4. Douglas C. Morris, Stephen D. Clements JR., John Pepper, 2008. Management of patient after Cardiac Surgery. In ValentinFuster, Robert A. O'Rourke, Richard A.Walsh eds. 2008 HURST's—The HEART, China: McGraw — Hill Companies, pp1504-1518.
5. Cliff K. Chong, Caroline Gerrard, Kimberley A. Goldsmith, Helen Dunning ham,AlainVuylsteke, 2007. Delayed re-exploration for bleeding after coronary arteryBypass surgery results in adverse outcomes. *European Journal of Cardio-thoracicSurgery*, 31(2007):834—838
6. Julia _Canádyová, DušanZmeko and AlešMokráček, 2012. Re-exploration for bleeding or tamponade after cardiac operation. *Interactive Cardiovascular andThoracic Surgery*, 14 (2012): 704—708.
7. Marco Ranucci, Giuseppe Bozzetti, Antonio Ditta, Mauro Cotza, Giovanni Carboni and Andrea Ballotta, 2008. Surgical Re-exploration after Cardiac Operations: Why a worse Outcome? *Ann ThoracSurg*, 86 (2008):1557— 1562.
8. Marek Gwozdziwicz, Peter Olsak, Vladimir Lonsky, 2008. RE-OPERATIONS FORBLEEDING IN CARDIAC SURGERY: TREATMENT STRATEGY. *Biomed Pap Med FacUnivPalacky Olomouc Czech Repub*, 152(1): 159—162
9. ShishirKarthik, Antony D. Grayson, Emer E. McCarron, D. Mark Pullan, andMichael J. Desmond, 2004. Re-exploration for Bleeding After Coronary ArteryBypass Surgery: Risk Factors, Outcomes, and the Effect of Time Delay. *Ann ThoracSurg*, 78 (2004): 527—534
10. FaustoBiancaria, ReijaMikkolaa, JouniHeikkinena, JarmoLahtinena, K.E. JuhaniAiraksinenb, TatuJuvonena, 2012. Estimating the risk of cOETiplications related to re-exploration for bleeding after adult cardiac surgery: a systematic review and MetaAnalysis. *European Journal of Cardio-Thoracle Surgery*, 41(2012): 50—55
11. Colson PH, Gaudard P, Fellahi JL, Bertet H, Faucanie M, Amour J, Blanloeil Y, Lanquetot H, Ouattara A, Picot MC, ARCOTHOVA group. Active bleeding after cardiac surgery: a prospective observational multicenter study. *PLoS One*. 2016 Sep 2;11(9):e0162396.
12. KristensenKL , Rauer LJ, Mortensen PE, Kjeldsen BJ. Reoperation for bleeding in cardiac surgery *Interact CardioVascThoracSurg*2012;14:709—13.
13. Elassal AA, Al-Ebrahim KE, Debis RS, Ragab ES, Faden MS, Fatani MA, Allam AR, Abdulla AH, Bukhary AM, Noaman NA, Eldib OS. Re-exploration for bleeding after cardiac surgery: reevaluation of urgency and factors promoting low rate. *Journal of Cardiothoracic Surgery*. 2021 Dec;16(1):1-1.
14. Peric V, Jovanovic-Markovic S, Peric D, Rasic D, Novakovic T, Dejanovic B, Borzanovic M. Quality of life in patients of different age groups before and after coronary artery by-pass surgery. *Annals of Thoracic and Cardiovascular Surgery*. 2015:oa-15.
15. Al-Attar N, Johnston S, Jamous N, et al. Impact of bleeding complications on length of stay and critical care utilization in cardiac surgery patients in England. *J Cardiothorac Surg*. 2019;14(1):1—10.
16. Alain Vuylsteke, Christina Pagel, Caroline Gerrard, Brian Reddy, SamerNashef,PoppyAldam, Martin Utley, 2011. The Pap worth Bleeding Risk Score: a Stratification scheme for identifying cardiac surgery patients at risk of excessive early Postoperative bleeding. *European Journal of Cardio-thoracic Surgery*, 39 (2011): 924—931
17. Kirklin JW, Barratt-Boyes BG. 1986. Anesthesia for Cardiovascular. In: KirklinBarratt-Boyes eds.2003. *Cardiac surgery*. New York: John Wiley & Sons, pp. 164—167.