

Incidence of Perioperative Complications Associated with Cardiac Surgery Under Cardiopulmonary Bypass

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ABSTRACT

Introduction: Following cardiac surgery, complications such as cardiac, pulmonary, renal, and neurological diseases, infections like pneumonia or sepsis, and extended stays in the intensive care unit (ICU) and hospital are signs of both the quality of care and the quality of life. Therefore, it's critical to pinpoint the complications that put patients at risk for substantial postoperative morbidity and extended lengths of hospital stay.

Aims & Objectives: To study nature and incidence of perioperative complications in patients undergoing cardiac surgery under cardiopulmonary bypass.

Material & Methods: This study included 151 patients, of any age, either sex, planned for cardiac surgery under cardiopulmonary bypass (like Valve replacement, valve repairs, CABG, myxoma excision, Congenital Heart Diseases like ASD, VSD, TOF). The data regarding demographic profile and postoperative complications were collected. **RESULTS;** There were total of 151 patients in our study including 66 males (43.7%) and 85 females (56.3%). Age of the subjects ranged from 1 to 70 years with a mean of 26.39 ± 18.67 years (Median of 25 years). Mean age of males was 26.27 ± 20.72 years and mean age of females was 26.49 ± 17.03 years. About 51 % patients in our study had at least one of the complications. The most common complication was rhythm disorder which was present in 34.4% of all patients. ARDS developed in 1.3% of patients. Infections were present in 27 patients (17.9%). Dyselectrolytemia was present in 11

patients (7.3%).

Conclusion: Cardiac surgery under cardiopulmonary bypass is associated with as cardiac, pulmonary, renal, and neurological diseases, infections like pneumonia or sepsis. The most common complication was rhythm disorder which was present in 34.4% of all patients. ARDS developed in 1.3% of patients. Infections were present in 27 patients (17.9%). Dyselectrolytemia was present in 11 patients (7.3%).

Keywords: Cardiopulmonary Bypass (CPB), Length of stay (LOS)

INTRODUCTION

Due to improvements in medical treatment and perioperative cardiac surgical critical care, the field of cardiac surgery has significantly improved. However, proportion of high-risk patients has increased, because more older patients with more concomitant conditions are presenting for heart surgery [1,2]. Open-heart surgery frequently employs the cardiopulmonary bypass (CPB) technique, which aids in maintaining systemic perfusion and oxygenation [3]. However, because mortality does not always correlate with complication rates and length of stay (LOS) in hospitals, it is not a sufficient indicator of healthcare quality or cost-effectiveness. Following cardiac surgery, complications such as cardiac, pulmonary, renal, and neurological diseases, infections like

pneumonia or sepsis, and extended stays in the intensive care unit (ICU) and hospital are signs of both the quality of care and the quality of life [4]. Therefore, it's critical to pinpoint the complications that put patients at risk for substantial postoperative morbidity and extended lengths of hospital stay. The Cardiac Anaesthesia Risk Evaluation score [5], Tuman score [4], Tu score [6], European System for Cardiac Operative Risk Evaluation score [7], are a few result prediction models used for cardiac surgery that use pre-operative characteristics to forecast the post-operative prognosis and complication rates.

Aims & Objectives: To study nature and incidence of perioperative complications in patients undergoing cardiac surgery under cardiopulmonary bypass.

MATERIALS & METHODS

This study was conducted in the Department of Anaesthesiology and Critical Care,

SKIMS, Soura J&K for a period of two years . Prior to proceeding with the study, institutional ethical committee clearance was sought for this observational study. A proper informed consent was taken from all the patients included in the study. This study included 151 patients, of any age, either sex, planned for cardiac surgery under cardiopulmonary bypass (like Valve replacement, valve repairs, CABG, myxoma excision, Congenital Heart Diseases like ASD, VSD, TOF). The data regarding demographic profile and perioperative complications were collected.

Statistical Analysis: All the continuous variables of the study have been shown in terms of descriptive statistics like mean, standard deviation and categorical variables in terms of frequency and percentage. Data was expressed as mean \pm SD for interval and count (%) for categorical variables

RESULTS

Table 1: Age and Sex Distribution of the Study Subjects

Age in Years	Number of Subjects	Male		Female	
		N	Percentage (%)	N	Percentage (%)
<10	39	20	(51.3%)	19	(48.7%)
10 – 19	29	14	(48.3%)	15	(51.7%)
20 – 29	14	4	(28.6%)	10	(71.4%)
30 – 39	23	3	(13.0%)	20	(87.0%)
40 – 49	24	11	(45.8%)	13	(54.2%)
50 – 59	14	8	(57.1%)	6	(42.9%)
\geq 60	8	6	(75.0%)	2	(25.0%)
Total	151	66	(43.7%)	85	(56.3%)

Table 2 : Postoperative complications observed in the study subjects

Complication	Total (n=151)	
	N	Percent
• Any	77	51.0%
• Cardiac rhythm disorder	52	34.4%
• ARF	36	23.8%
• Bleeding	1	0.7%
• ARDS	2	1.3%
• Dyselectrolytemia	11	7.3%
• Infections	27	17.9%
• No. of complications		
➤ No Complication	74	49.0%
➤ 1	44	29.1%
➤ 2	20	13.2%
➤ 3	8	5.3%
➤ 4	4	2.6%
➤ 5	1	0.7%

The above table shows the age distribution of the patients in our study. There were total of 151 patients in our study including 66 males

(43.7%) and 85 females (56.3%). Age of the subjects ranged from 1 to 70 years with a mean of 26.39 ± 18.67 years (Median of 25

years). Mean age of males was 26.27 ± 20.72 years and mean age of females was 26.49 ± 17.03 years. There was no statistically significant difference in the age between male and female subjects.

Table 2 shows the complication profile in our study patients. About 51 % patients in our study had at least one of complications as mentioned in the above table. The most common complication was rhythm disorder which was present in 34.4% of all patients. ARDS developed in 1.3% of patients. Infections were present in 27 patients (17.9%). Dyselectrolytemia was present in 11 patients (7.3%).

DISCUSSION

About 51% patients (77 of 151) in our study had at least one of the complications as tabulated in Table 2. Williams *et al* (1965) [12] studied incidence of complications in patients undergoing cardiopulmonary bypass and found that among his 150 patients, 107 patients (71.33%) had complications and this occurrence was higher than in our study.

In a similar study conducted by Kashmiri *et al* (2008) [13], he reported that the incidence of complications after cardiopulmonary bypass were present in 118 patients out of 312 patients (37.82 %).

Cardiac Rhythm Disorders

Cardiac rhythm disorder was present in 34.4 % of our patients which is higher compared to study conducted by Kashmiri *et al* (2008) [13] in which rhythm disorder was present in only 8% of patients. Williams *et al* (1965) [12] studied incidence of complications in patients undergoing cardiopulmonary bypass and found that rhythm disorders occurred in 24.59 % of their patients but frank AF occurred in 11% of his patients.

Arf

36 patients out of 151 patients (23.8 %) had acute renal failure. Our results are similar to study conducted by Massoudy *et al* (2008) [14] who reported that out of 101 patients who underwent cardiopulmonary bypass, 28 patients (27.7%) had acute renal failure during hospital stay.

Paarmann *et al* (2013) [15] prospectively

sampled data from 136 consecutive patients and also analyzed the data retrospectively. Plasma and urine for determination of biomarkers and creatinine were collected at predefined time points before, immediately after, and up to three days after surgery. 29 (21.3 %) patients developed acute kidney injury.

ARDS

ARDS developed in 2 patients during hospital stay constituting 1.3% of all patients in our study. Milot *et al* (2001) [16] reported that among his 3278 patients, 13 patients developed ARDS during hospital stay. The incidence of ARDS was 0.4%.

Qubati *et al* (2013) [17] reported the incidence of ARDS in 3.35% of patients in open heart surgeries. Kashmiri *et al* (2008) [13] reported that among his 312 patients, 2 patients developed ARDS constituting 0.64% of total patients.

Dyselectrolytemia

Dyselectrolytemia was present in 11 patients (7.3%). Williams *et al* (1965) [12] in his study found that the incidence of dyselectrolytemia was present in 42.0% patients.

Infections

Infections were present in 27 patients (17.9 %). This is also consistent with the study conducted by Kashmiri *et al* (2008) [13] who reported that 10 patients out of 312 patients (8.5%) who had undergone cardiac surgery with CPB had infections (pneumonia, mediastinitis, wound site infection, septicemia). Our results are comparable to Park *et al* (1996) [18] who reported that 49 patients out of 260 patients (18.84%), had infections (wound, mediastinitis, leg infection, respiratory) after Coronary Artery Bypass Grafting under CPB.

CONCLUSIONS

Cardiac surgery under cardiopulmonary bypass is associated with cardiac, pulmonary, renal, and neurological diseases, infections like pneumonia or sepsis. As with previous data on cardiac surgery our study also had a myriad of postoperative complications.

Declaration by Authors

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Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Stephens RS, Whitman GJR. Postoperative critical care of the adult cardiac surgical patient: Part II: procedure-specific considerations, management of complications, and quality improvement. *Crit Care Med.* 2015;43(9):1995-2014.
2. Stephens RS, Whitman GJR. Postoperative critical care of the adult cardiac surgical patient. Part I : routine postoperative care. *Crit Care Med.* 2015;43(7):1447-1497.
3. Shinde SB, Golam KK, Kumar P, Patil ND. Blood lactate levels during cardiopulmonary bypass for valvular heart surgery. *Ann Card Anaesth.* 2005;8(1):39-44.
4. Tuman KJ, McCarthy RJ, March RJ, Najafi H, Ivankovich AD. Morbidity and duration of ICU stay after cardiac surgery; A model for preoperative risk assessment. *Chest.* 1992;102(1):36-44.
5. Dupuis J-Y, Wang F, Nathan H, Lam M, Grimes S, Bourke M. The cardiac anesthesia risk evaluation score. *Anesthesiology.* 2001; 94(2):194-204.
6. Tu J, Jaglal S, Naylor C. Multicenter validation of a risk index for mortality, intensive care unit stay, and overall hospital length of stay after cardiac surgery. *Circulation.* 1995;91:677-684.
7. Parolari A, Pesce LL, Trezzi M, et al. EuroSCORE performance in valve surgery: a meta-analysis. *Ann Thorac Surg.* 2010;89 (3):787-793.
8. Bhukal I, Solanki SL, Ramaswamy S, Yadnanapudi LN, Jain A, Kumar P. Perioperative predictors of morbidity and mortality following cardiac surgery under cardiopulmonary bypass. *Saudi J Anaesth.* 2012;6(3):242-247.
9. Toraman F, Evrenkaya S, Yuce M, et al. Lactic acidosis after cardiac surgery is associated with adverse outcome. *Heart Surg Forum.* 2004;7(2):E155-E159.
10. Hajjar LA, Almeida JP, Fukushima JT, et al. High lactate levels are predictors of major complications after cardiac surgery. *J Thorac Cardiovasc Surg.* 2013;146(2):455-460.
11. Kapadimos T, Angelopoulos E, Vasileiadis I, et al. Determinants of prolonged intensive care unit stay in patients after cardiac surgery: a prospective observational study. *J Thorac Dis.* 2017;9(1):70-79.
12. Williams JF, Morrow AG, Braunwald E. The Incidence and Management of Medical Complications Following Cardiac Operations. *Circulation* 1965; XXXII: 608-619.
13. Kashmiri ZA, Dar MI, Idrees F, Khan QA, Hussain A. Incidence of complications after cardiac surgery, single unit experience. *Pakistan heart journal* 2008; 41: 41-48.
14. Massoudy P, Wagner S, Thielmann M, Herold U, Assenmacher EK et al. Coronary artery bypass surgery and acute kidney injury-impact of the off-pump technique. *Nephrology Dialysis Transplant,* 2008; 23: 2853–2860.
15. Paarmann H, Charitos EI, Beilharz A, Heinze H, Schon J, Berggreen A, Heringlake M. Duration of cardiopulmonary bypass is an important confounder when using biomarkers for early diagnosis of acute kidney injury in cardiac surgical patients. *Applied Cardiopulmonary Pathophysiology* 2013; 17: 284-297.
16. Milot J, Perron J, Lacasse Y, Tourneau LL, Cartier PC, Maltais FO. Incidence and predictors of ARDS after cardiac surgery. *Chest* 2001; 119 (3): 884 – 888.
17. Qubati FA, Damag A, Noman T. Incidence and outcome of pulmonary complications after open cardiac surgery. *Egyptian Journal of Chest Diseases and Tuberculosis* 2013; 62: 775–780.
18. Park YJ, Yoon JW, Kim KI, Lee YJ, Kim KW. Subclinical Hypothyroidism Might Increase the Risk of Transient Atrial Fibrillation After Coronary Artery Bypass Grafting. *The Annals of Thoracic Surgery* 1996; 87(6): 1846-1852.

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