

ORIGINAL ARTICLE

Outcome of cardiac arrest post open heart procedures in a tertiary care hospital

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ABSTRACT

Introduction: Cardiac arrest following an open-heart surgery can be a devastating event, leading to severe mortality and morbidity. Various factors may precipitate cardiac arrest by decreasing perfusion to the heart. Open chest cardiac resuscitation is superior to closed chest cardiac resuscitation in restoring blood flow to the heart. The time between the onset of cardiac arrest to the provision of necessary method of resuscitation is of crucial significance, in deciding the outcome. If perfusion is not restored to the heart, within 5 minutes of closed chest cardiac resuscitation, a re-sternotomy is indicated. In this article we document number of cardiac arrests after open heart procedures in a tertiary care hospital.

Methodology: We retrospectively analyzed 2.5 year data of cardiac patients admitted to our Cardiac Intensive Care Unit from January 2014 to June 2016, after open heart procedures, and recorded the number of cardiac arrests post open heart procedures, and the outcome of the resuscitation.

Results: In 2.5 years out of 2505 admissions to the Cardiac Intensive Care Unit (CICU), 44 (1.76 %) experienced cardiac arrest out of which only 4 (9.09%) patients survived to be discharged home.

Conclusion: The results of our study show that the survival rate of cardiac arrests post open heart procedures in our Cardiac Intensive Care Unit is 9.09% as compared to most of published studies from advanced centers showing a survival rate of 25 to 50%. To find out the cause-effect factors was not the objective of this study, but needs to be researched in all Cardiac Intensive Care Units of the country.

Key words: Sudden Cardiac Arrest; Heart arrest; Cardiac Surgical Procedures; Resuscitation; Cardiopulmonary resuscitation; Advanced Cardiac Life Support

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INTRODUCTION

Unexpected cardiac arrest following cardiac surgery is a serious complication and is associated with significant morbidity and mortality. The reported incidence of unexpected cardiac arrest following open heart procedures varies from 0.7 to 3%. Precipitating factors include arrhythmias, mechanical problems such as tamponade and graft torsion, perioperative myocardial infarction, and strokes. The above mentioned conditions may result in decreased coronary artery perfusion, leading to cardiac arrest.^{1,2} Since the discovery of closed-chest cardiac massage, it has been widely introduced into the clinical practice by Kouwenhoven et al. in 1960, with resuscitation attempted in a variety of

clinical settings.³ Despite its ease of applicability, closed-chest cardiac resuscitation has low resuscitation rates when compared to open chest cardiopulmonary resuscitation, which is more hemodynamically superior in restoring perfusion to the heart.⁴ A mid-line sternotomy may be performed to provide access to the heart when performing open chest cardiopulmonary resuscitation.^{5,6} As in any arrest, the time interval between the arrest and provision of advanced cardiac life support, is of crucial importance in predicting the outcome of the event.⁷ The rate of achieving a successful resuscitation declines as timing between the arrest and the intervention increases, For patients who have undergone cardiac surgery, emergency sternotomy and open chest cardiac resuscitation

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should be considered as an early intervention during cardiac arrest. The patients likely to benefit from open chest cardiac massage, are the ones who have undergone surgery within 24 hours and in whom chest reopening is achieved within 10 minutes of cardiac arrest.^{8,9} If in patients post open heart procedure, hemodynamic stability cannot be achieved within 5 minutes of arrest with closed chest compressions or defibrillation, A re sternotomy is indicated.^{10,11} Infectious complications following an open chest cardiac massage, are less than 10% in an unprepared chest, other complications due to closed chest compressions, are broken ribs, liver lacerations and heart injuries, such as left or right ventricle rupture.^{12,13} In this article we explore outcomes of cardiac arrest following an open heart procedure, in a tertiary care hospital.

METHODOLOGY

We analysed the data from cardiac intensive care unit (CICU of Aga Khan University hospital, to see how many patients had cardiac arrest post cardiac surgery, and to assess the outcome of the resuscitation. The duration of data collection was from January 2014 to June 2016. The patient population included all adult and pediatric patients undergoing open heart procedures.

RESULTS

During the year 2014 (Table 1), there were 10 reported cases of cardiac arrests in CICU, out of which only 1 patient survived and the rest expired. In the year 2015, 27 patients suffered from cardiac arrest, while only 2 (6.9%) could be successfully resuscitated while the rest expired. In the year 2016 (Table 3) during the first six month, there were 7 instances of cardiac arrest out of only which 1 (14.29%) could be successfully resuscitated.

Table 1: CICU data for the year 2014

Month	Number of cardiac arrests	Patients that survived
January	1	0
March	1	0
April	1	0
May	1	1
July	1	0
September	2	0
October	1	0
November	1	0
December	1	0
Total	10	1 (10%)

Table 2: CICU data for the year 2015

Month	Number of cardiac arrests	Patients that survived
March	6	1 (16.5%)
April	1	1 (100%)
May	3	0
June	4	0
July	6	0
August	2	0
September	1	0
October	1	0
November	3	0
December	2	0
Total	29	2 (6.9%)

Table 3: CICU data for the year 2016

Month	Number of cardiac arrests	Patients that survived
January	1	0
February	2	0
March	2	0
June	2	1 (50%)
Total	7	1 (14.29%)

A total of 2505 patients were admitted to the CICU after open cardiac surgery in 2.5 years out of which 44 (1.76%) suffered from cardiac arrest, out of which only 4 (9.09%) patients could be successfully resuscitated.

DISCUSSION

Cardiac arrest can be a life threatening complication after a cardiac surgery. El-Banayosy Et. Al reported 70% survival rate of cardiopulmonary resuscitation in patients undergoing cardiac arrest after cardiac procedure, while our survival rate is only 9.09%. The author attributed the high success rate of resuscitation to the selection of in-hospital patients who were carefully monitored and comparatively hemodynamically stable.¹⁴ While Mackay Et al reported that out of 818 patients who suffered from cardiac arrest, 79 required chest reopening. Out of 79 patients 20 (25%) patients survived to be discharged. Those who benefitted from sternotomy for open chest cardiac resuscitation were the patients who were 24 hours post cardiac surgery or less, and in whom chest reopening was achieved

within 10 minutes of cardiac arrest.^{7,9} Several studies reported the survival rate of cardiac arrest post cardiac surgery to be upto 50%.^{15,16} Cardiac arrest in patients undergoing surgical interventions presents a huge challenge. Traditional methods of resuscitation in these patients can result in harm.^{17,18} The development of a standard cardiac surgery-specific resuscitation that incorporates those features unique to these patients is crucial and needed. No such protocol exists up to date, thus approach to these critically ill patients is variable, needing highly skilled personnel, which results in delay of intervention administered to these patients.¹⁹ European resuscitation council recently published guidelines on how to manage cardiac arrest in patients who have undergone cardiac procedures, which state that chest reopening should be performed within 10 minutes, if perfusion is not restored by external compressions or defibrillation, also mentioning that non-surgical medical staff should be trained to remove sutures

and reopen the wound while skilled personnel are on their way, so that immediate open chest cardiac resuscitation can be performed to revive the patient.²⁰

CONCLUSION

The results of our study show that the survival rate of post open heart procedures cardiac arrests in our Cardiac Intensive Care Unit is only 9.09% as compared to most of published studies from advanced centers showing a survival rate of 25 to 50%. Although the cause of this relatively poor outcome may be multifactorial, but needs to be researched in all Cardiac Intensive Care Units of the country for remedial measures to be taken.

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Author Contribution: HS: Concept, manuscript editing and reviewing; MT: Literature search and manuscript writing

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