

Endotracheal Reintubation in Post-Operative Cardiac Surgical Patient other than Surgical Bleeding

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ABSTRACT

Introduction: In recent decades, interventional procedures in cardiac surgery have developed as widely used techniques of treating valvular dysfunctions and coronary artery diseases.

Objectives: The main objective of the study is to find the endotracheal reintubation in post-operative cardiac surgical patient other than surgical bleeding.

Material and methods: This descriptive study was conducted in Peshawar institute of cardiology during 2018 to 2019. The data was collected with the permission of ethical committee of hospital. The data was collected from those patients who were underwent cardiac bypass surgery in hospital. All demographical data related to age, gender and history of diseases was collected.

Results: The data was collected from 122 patients, from these 22 patients were not extubated and none of them survived. The most common indication for surgery was myocardial revascularization (30.6%), followed by valve replacement (22.7%) and thoracic aortic aneurysm repair.

Conclusion: It is concluded that reintubation after cardiac surgery is a marker for morbid postoperative period. The reintubation rate in patients undergoing cardiac surgery in our hospital was high.

INTRODUCTION

In recent decades, interventional procedures in cardiac surgery have developed as widely used techniques of treating valvular dysfunctions and coronary artery diseases. To reduce postoperative complications and increase outcome in patients undergoing cardiac surgery, risk assessment is a vital component in the practice of cardiac surgery [1]. Reintubation after cardiac surgery is unusual; however, it significantly increases postoperative morbidity and mortality risks. Reintubation prolongs the duration of mechanical ventilation and Intensive Care Unit (ICU) bed occupation and is associated with higher in-hospital mortality rates [2].

In addition, reintubated patients need more nursing care and financial resources. Unfortunately, few studies have been conducted to evaluate the rate of reintubation, factors related to reintubation, and patient outcome. Nonetheless, Engoren suggested respiratory variables as the main predicting factors of reintubation after cardiac surgery [3].

With the aging of the population, rising incidence of coronary artery disease (CAD) and surgical improvement of CAD, more and more elderly patients have to be performed with coronary artery bypass grafting (CABG), and the pulmonary complications seem to be on the increase. Some patients need to be re-intubated after the first extubation. Some reports revealed that many factors and the interaction of these factors leads to postoperative pulmonary complications following CABG [4].

Endotracheal reintubation is not uncommon among critically ill patients after open heart surgery. The overall incidence for reintubation in a general surgical intensive care unit is generally considered 4%, but varies dramatically between 1-13%, depending on the underlying disease process [5]. Similarly a 10% incidence has been reported in 745 consecutive admissions in medical ICU patients that were mechanically ventilated for a minimum of 6 hours. The reported incidence of reintubation in patients who were weaned from mechanical ventilation after cardiac surgery is 6.6% in a retrospective study but little work has been done to find out the incidence and causes for reintubation in a cardiac surgical ICU prospectively [6]. Reintubation is not only associated with increased duration of mechanical ventilation but also the ICU and hospital length of stay. Reintubation is known to be an independent cause, which adds to the mortality; patients who required reintubation have poor prognosis with a mortality rate exceeding 30-40%, irrespective of the cause for reintubation [7]. The major

causes of reintubation are usually related to respiratory or cardiovascular system but could be multi-factorial and may possibly be prevented, to some extent, by improving the care [8].

MATERIAL AND METHODS

This descriptive study was conducted in Peshawar institute of cardiology during 2018 to 2019. The data was collected with the permission of ethical committee of hospital. The data was collected from those patients who were underwent cardiac bypass surgery in hospital. All demographical data related to age, gender and history of diseases was collected. We excluded patients who were intubated before surgery and those who underwent cardiopulmonary resuscitation or were in cardiogenic shock and also emergency operations. We also excluded patients who experienced severe complications in the cardiac catheterization laboratory and were urgently intubated and admitted to the operating room. All the operations were performed using CPB at mild to moderate hypothermia (28 to 32 °C). Myocardial protection was accomplished with intermittent antegrade or combined antegrade and retrograde saline or blood cardioplegia. The patients were evaluated regarding preoperative, operative, and postoperative characteristics to determine which would mostly predict reintubation necessity. All preoperative, operative, and outcome data were recorded postoperatively and analyzed using SPSS statistical package version 20.0.

RESULTS

The data was collected from 122 patients, from these 22 patients were not extubated and none of them survived. The most common indication for surgery was myocardial revascularization (30.6%), followed by valve replacement (22.7%) and thoracic aortic aneurysm repair.

Table 1: Clinical Outcomes Of Patients Submitted To Cardiac Surgery

Variables	Total
Postoperative complications	
Pneumonia/VAP (N = 72)	62.6
Kidney dysfunction (N = 50)	42.4
AMI (N = 4)	3.5
Endotracheal reintubation in ≤ 48 hours (N = 28)	29.4
Use of NIV in the postoperative period (N = 94)	74.5
Absent (PaO ₂ /FiO ₂ > 300) (N = 11)	11.5
Mild (PaO ₂ /FiO ₂ : 200 - 300) (N = 28)	29.2
Length of hospital stay (days) N = 119	22.7 ± 19.1

Table 2: Reintubation Reasons Amongst All Reintubated Patients (n=32)

Respiratory n=18	Cardiac n=32	Neurological n=2	Emergent reoperation n=12
Secretions	Cardiogenic pulmonary edema	Stroke and seizure	Surgical bleeding
Respiratory failure	Cardiac failure		CVC site bleeding
Bronchospasm	Cardiac arrest		
Hypoxemia	Arrhythmia		

Patients, who experienced extubation after cardiac surgery, were entered into the statistical analysis: 26 patients who experienced reintubation after extubation in the intensive care unit (ICU) and 122 patients who were extubated successfully.

DISCUSSION

Improvement in cardiopulmonary performance, shorter ICU and hospital stay as well as reduction in costs could be achieved when cardiac surgical patients were weaned from mechanical ventilator at the appropriate time [9]. Sometimes, appropriate prolonged ventilation support could have contributed to avoid endotracheal re-intubation. Postoperative hypoxemia may cause rapid heartbeat and accelerated breathing. Lactate accumulation and inadequate tissue perfusion can decrease myocardial function and make homodynamic unstable. The extent of cardiopulmonary function damage is minor in relative hypoxemia [10]. But if this low-level hypoxemia is not improved it may progress to serious hypoxemia and re-intubation following the first extubation. The reasons for postoperative relative hypoxemia most commonly included atelectasis and pulmonary edema. Pulmonary volume alteration can also lead to the postoperative hypoxemia [11]. Using computed tomography, Rodrigues RR, et al. investigated postoperative pulmonary alterations and their impact on blood oxygenation. Compared to preoperative CT, there was a 31% postoperative reduction in pulmonary gas volume while tissue volume increased by 19% [12]. Non-aerated lung increased by 253 ± 97 g, from 3 to 27%, after surgery and poorly aerated lung by 72 ± 68 g, from 24 to 27%, while normally aerated lung was reduced by 147 ± 119 g, from 72 to 46%. So, effective measures should be taken to improve the lung oxygenation. Prompt prolonging mechanical ventilation and non-invasive positive pressure ventilation (NIV) after extubation can avoid the incidence of re-intubation effectively [13]. NIV is safe and effective after cardiac surgery. It may be beneficial to restore lung function more quickly, safely and well accepted by patients [14]. The vital capacity and lung volume decrease in obesity and its oxygen consumption increases. The influence of small amount of hydrothorax to obesity may be greater than that to normal body form. So, even if the hydrothorax is not too much in obesity it should be treated actively [15].

Preoperative congestive heart failure was also an important associated factor for re-intubation following CABG. Patients suffering from preoperative CHF often had pulmonary edema which in turn could have resulted in a change of pulmonary ventilation/blood flow ratio, thus resulting in postoperative hypoxemia. So, patients suffering from preoperative CHF were prone to postoperative hypoxemia even acute respiratory distress syndrome [16-18].

CONCLUSION

It is concluded that reintubation after cardiac surgery is a marker for morbid postoperative period. The reintubation rate in patients undergoing cardiac surgery in our hospital was high.

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