

Cardiac anesthesia and COVID-19 outbreak: What should we know?

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The COVID-19 outbreak is public health emergency, spreads easily from human to human, and may cause acute severe respiratory syndrome. The anesthesia teams who perform this procedure are at risk aerosolization and need special consideration and safety measures. Cardiac anesthesiologist follows two aims, recognition of COVID-19 patients that need surgery and decreasing the risk of perioperative viral transmission to coworkers. An isolated operating room (negative pressure operating room for COVID-19) should be available. It is important to regulate workflow and practices, anesthesia management, healthcare, and staff. Cardiac anesthesiologist and health-care workers must be use guidelines to treat patients with COVID-19.

Key words: Anesthesia, cardiac surgical procedures, COVID-19, novel coronavirus

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INTRODUCTION

The World Health Organization announced COVID-19 outbreak as a public health emergency around the world on the last of January 2020 health care in situation to outbreaks of rising COVID-19, and hospital population are at notably enlarged risk for difficulty from disease. Transmission within health-care services to health staff was known 3.8% of COVID-19 cases.^[1] Potential forms of transmission include respiratory droplets, contact, infected surfaces, and the fecal-oral path.^[2] Now, there is no definite evidence of airborne transmission of COVID-19. When the patient is symptomatic, it is most likely to spread infection but can be transmitted by asymptomatic patient.^[3]

According to the study of Chen *et al.*, the most common sign and symptoms of this disease are fever, cough, and shortness of breath. Less common sign and symptoms of this disease are muscle pain, confusion, headache, sorethroat, rhinorrhea, and chest pain.^[4] Independent predictors of outcome in COVID-19 include age and

concomitant conditions (diabetes, heart diseases, obesity, hypertension, chronic kidney disease, and chronic obstructive pulmonary disease). The patients with coronary heart disease and heart failure are at high risk for exposure to the virus. COVID19 virus can possibility destabilize coronary plaque throughout numerous mechanisms such as systemic inflammatory responses and increased risk of acute events.^[5]

The role of the anesthesiologist at the time of the outbreak is to coordinate the treatment team in the operating room.^[1] COVID-19 can survive for at least 3 days on materials of operating room (steel device and plastic). Operating room needs cleaning performance more than usual, particularly for noncritical items such as near bedside equipment. This implementation decreases the risk of cross contamination during patient care^[5] Cardiac anesthesiologist follows two aims, recognition of COVID-19 patients that need surgery and decrease the risk of perioperative viral transmission to coworkers. An isolated operating room (negative pressure operating room for COVID-19) should be available. It is important to regulate workflow and practices, anesthesia

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management, health care, and staff. Cardiac anesthesiologist and health-care workers must be use guidelines to treat patients with COVID 19.^[6]

Therefore, in this article, we discuss about the strategic management with respect to cardiac operating room, the safety of cardiac surgery patients and cardiac anesthesiologist and health workers for prevention of the COVID-19, and what the cardiac anesthesiologist should do for the prevention of COVID-19.

GENERAL CONDITIONS IN OPERATING ROOM OF CARDIAC SURGERY FOR PREVENTION OF THE COVID-19

The evidence-based improvement shows combination deep cleaning and using ultraviolet (C) reduced environmental contamination.^[7] Enhanced handwashing, patient decolonization, environmental cleaning, vascular access care, and supervision optimization should be improved for better perioperative infection control for both viral and bacterial pathogens. Anesthesiologists including cardiac anesthesiologist and health-care providers can start with steps 1–4 that include hand hygiene, environmental cleaning, patient decolonization, and vascular care, then progress to a vigorous plan of constant carefulness and surveillance.^[8]

STRATEGIC MANAGEMENT IN OPERATING ROOM OF CARDIAC SURGERY FOR PREVENTION OF THE COVID-19

The strategic management are as following:

- In the situation of this pandemic, cardiac surgical procedures are restricted to urgent and emergent procedures^[1,3]
- A single negative pressure operating room should be with separate access for COVID-19 patients requiring surgery^[3]
- Personal protective equipment should be available in operating room for COVID-19^[4]
- Anesthetic drugs should be used by precaution due to cardiac side effects of COVID-19 medications (antiviral drugs)^[6]
- Cardiac anesthesiologists and health-care providers play an essential role to prepare airway management in the operating room. Therefore, the safety of the anesthesia providers and the patients who implicated in this procedure need special consideration and safety measures^[9]
- Standard monitoring (electrocardiogram, blood pressure, pulse oximetry, and end-tidal CO₂), invasive blood pressure, central venous pressure, and advanced hemodynamic monitoring transesophageal

echocardiography, bispectral index, cerebral oximetry,...) if needed, should be used in cardiac surgery patients who have COVID-19

- A close airway suction system for using should be prepared
- Difficult airway management equipment should be available
- Inotrope and vasopressor drugs including epinephrine, nor epinephrine, phenylephrine, and milrinone should be available. Emergency trolley should be immediately ready
- Mechanical hemodynamic support such as intra-aortic balloon pump and extracorporeal membrane oxygenation (ECMO) should be available. ECMO should be used in severe respiratory and/or cardiac failure
- If it is possible, the number of health-care members involve in the management should be reserved minimally with no or minimal exchange of staff in the duration of the procedure.

THE SAFETY OF THE CARDIAC SURGERY PATIENT

COVID-19 patients potentially implicate in myocardial injury and multi-organ failure that cause hemodynamic instability condition and decrease arterial oxygen saturation. While critically ill patient's oxygen reserve is very poor, this makes a huge challenge for anesthesia team. In these patients, for anesthesia induction, anesthetic drugs should be selected on clinical judgment and rapid sequence induction is recommended. For the prevention of contamination in the operating room, it is better not to use anesthetic inhalation. Cardiac anesthesiologists should use total intravenous anesthesia (TIVA) for induction and maintenance of anesthesia.^[10,11]

To avoid virus spreading, mask ventilation should not be used. If mask ventilation is required, it is recommended to put wet gauze around patient's nose and mouth. In this situation to prevent severe hypoxemia and circulatory failure, preoxygenation with 100% oxygen and muscle relaxant needs to be used. A high-efficiency particulate air filter should be used to the patient ending of the breathing circuit and between the expiratory branch and the anesthetic machine before anesthesia induction. Also for maximal patient safety, experienced anesthesia team (two anesthesiologists and one nurse) should perform tracheal intubation.^[9,10]

Cardiac anesthesiologists should be also aware that the COVID-19 clinical manifestations (fever, cough, dyspnea, and exhaustion) can be mistaken with signs and symptoms of complication of cardiac surgery including pleural effusion, pericardial effusion, endocarditis, and mediastinitis.^[6]

ANESTHESIA INDUCTION AND CONNECTING PATIENT TO THE ANESTHESIA MACHINE

Cardiac anesthesiologists should use TIVA for the induction of anesthesia. After muscle relaxant, the drug is administered (<15–20 s), and tracheal intubation by video laryngoscope with a disposable cover may be chosen over direct visualization to decrease the risk of droplet transmission. Fogging of goggles is a serious challenge for the tracheal intubation and for the care providers because of poor visibility; therefore, using antifogging agent of the inner site of goggles is recommended, then inflating endotracheal tube cuff. When tracheal intubation is difficult, a laryngeal mask should be used temporarily, and a multidisciplinary difficult airway team and bedside tracheostomy should be available.^[10,12]

Cardiac anesthesiologists prove the location of the tracheal tube by auscultation and observation of bilateral chest expansion and end-tidal CO₂ measurement. By inserting a filter on the respiratory tract, the patient is connected to the anesthesia machine.^[3,10,13]

THE SAFETY OF THE CARDIAC ANESTHESIOLOGISTS AND HEALTH-CARE PROVIDER

Cardiac anesthesiologists and health-care workers play a vital role to set up airway management in an operating room. As the anesthesia team and the health-care providers who perform this procedure are at risk of aerosolization, there is a need for special consideration and safety measures. According to the study of Luo *et al.*, a high level of protection is necessary for the prevention of infection.^[10] Standard three levels are considered as following:

(1) Hand washing → head cover → mask N95 → surgical mask → isolated gown → disposable latex gloves → (2) goggles → protective clothing → disposable latex gloves → shoe covers → (3) disposable gown → disposable latex gloves → full head cover [Figure 1].

The intubation team should be dressed in gowns, double mask with N95, and double gloves.

The person who is doing intubation should wear a third pair of gloves and remove them instantly after tracheal intubation.^[1,10]

CONCLUSION

The COVID-19 outbreak is a public health emergency, spreads easily from human to human, and may cause acute severe respiratory syndrome. The safeties of the anesthesia team who perform this procedure are at risk aerosolization



Figure 1: Protection of health-care providers in the emergency operating room for the prevention of COVID-19

and need special consideration and safety measures. Cardiac anesthesiologist follows two aims, recognition of COVID-19 patients that need surgery and decrease the risk of perioperative viral transmission to coworkers. An isolated operating room (negative pressure operating room for COVID-19) should be available. It is important to regulate workflow and practices, anesthesia management, health-care, and staff. Cardiac anesthesiologist and health-care workers must be use guidelines to treat patients with COVID-19.

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Conflicts of interest

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