

Sevoflurane as a Rescue Agent for Difficult Intubation in Cardiac Surgical Patients

Usha Kiran*, Ashok K.**, Shivani Aggarwal**

Authors Affiliation

*Professor and Head **Senior Resident,
Department of Cardiothoracic
Anaesthesia, All India Institute of
Medical Sciences, Ansari Nagar, New
Delhi-110029, India.

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Ashok Kumar
Senior Resident, Cardiac Anaesthesia
Office, 7th floor, C.N. Center,
Department of Cardiothoracic
Anaesthesia, All India Institute of
Medical Sciences, Ansari Nagar,
New Delhi-110029, India.
E-mail:
ashok.medickaramsi@gmail.com

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Abstract

Managing difficult airway in a patient undergoing cardiac surgery is critical due to balance in optimal hemodynamics and depth of anaesthesia. Sevoflurane has the property of rapid recovery from anaesthesia. We had two patients undergoing cardiac surgery with restricted mouth opening and anticipated difficult airway. First patient was planned for pulmonary valve replacement for severe pulmonary regurgitation and second patient for bentall procedure for severe aortic stenosis with aortic root dilatation. Both the patients induced with increments of sevoflurane and successfully intubated without apnea or complications. We consider sevoflurane is the agent of choice for induction in cardiac surgical patients with difficult airway. Sevoflurane has advantages of maintaining stable hemodynamics and less chances of apnea.

Keywords: Difficult Airway; Sevoflurane; Cardiac Surgery.

Introduction

Induction of anaesthesia in a known difficult airway case is fearful experience to any anaesthetist. Better mask ventilation and intubation is necessary to avoid hypoxic complications especially in patients undergoing cardiac surgery. Incidence of difficult intubation is about 8% and difficult mask ventilation is 7.5% in a prospective study by Prerna et al [1]. A balance between maintaining a patent airway and depth of anaesthesia is difficult to achieve. Sevoflurane has better control in induction and also termination of anaesthesia due to less blood gas coefficient. Hence we considered using sevoflurane for cardiac surgical patients with difficult airway. Here is our experience with two anticipated difficult airway cases using sevoflurane.

Case I

Our first patient was a 49yr old male, weighing 98kg came with chief complaints of increased breathlessness since 5 years and history of palpitations since 6 months. Patient was presented

for redo-cardiac surgery. Patient had previous surgical history of pulmonary valvotomy with Infundibular resection in our institute when he was 9yr old. Trans-thoracic echocardiography was done and diagnosis to have thickened and flial pulmonary valve with free severe Pulmonary insufficiency, trivial tricuspid insufficiency and dilated right heart requiring pulmonary valve replacement with cardiopulmonary bypass. Preoperative assessment of airway shown mouth opening of 2cm, mallampatti grade 4 and beard was present predicting it a difficult intubation and difficult ventilation. Patient was having atrial fibrillation with controlled ventricular rate for which he is on verapamil 80mg.

Management

Operating room was prepared with difficult intubation equipment including airways of different size, boogie, classic laryngeal mask airway(LMA), intubating LMA and fibroptic bronchoscope. Monitors attached were ECG, pulse oximetry and bispectral index. Invasive arterial line placed in left hand after giving local anaesthetic. Induction done with increments of sevoflurane 1% to 7%. Once MAC

value 2.5 is achieved with BIS of 45, a check laryngoscope was attempted, Cormack Lehane grade 4 was found. With pressure epiglottis was visible, inj. succinylcholine 1.5mg/kg was given and blindly bougie was passed. Endotracheal tube was passed over bougie and patient was intubated successfully. Intubation response was blunted by giving inj. Xylocard 1mg/kg.

Case II

Our second case was a 24yrs male who was admitted with chief complaints of chest pain while exertion, syncope and palpitations since 2yrs. Trans-thoracic echocardiography diagnosed bicuspid aortic valve with severe aortic stenosis and dilated aortic root was found. Patient was admitted for aortic valve replacement/Bentall procedure. Airway examination of this patient shown restricted mouth opening of 1.5cm breadth. History of Temporo-mandibular joint ankylosis was present.

Management

Operation theatre was prepared with difficult intubation equipment. Different size airways, bougie, laryngeal mask airways and fibro-optic bronchoscope. Standard monitors attached ECG, pulse oximetry, invasive arterial line and bispectral index attached. Sevoflurane was given in increments of 1% to 7%, after loss of consciousness and maintaining spontaneous breaths laryngoscopy was attempted. Laryngoscope was passed freely and larynx posterior part was visualized. Cormack-Lehane grade 3B was found, with pressure posterior part of larynx is visualized and Inj. succinylcholine 1.5mg/kg was given. Patient was intubated without any need of intubation assisting device.

Discussion

Performing difficult intubation in a cardiac patient is a stressful situation for an anaesthesiologist. Intubation in a patient with cardiac disease requires pre-set goals with stable haemodynamics. Performing awake fibro-optic intubation even with good airway anaesthetizing techniques produces anxiety related tachycardia and hypertension.

Primary goal in difficult airway patients is to maintain spontaneous ventilation which we managed using sevoflurane in both the patients. Induction with intravenous anaesthetics have property of inducing apnea for a considerable period

of time which is not desirable. Among inhalational anaesthetics only halothane and sevoflurane are used for induction as they have sweet odour. Halothane is not considered in cardiac surgical patients because of its pro-arrhythmogenic, hypotensive and cardiac-depressant property [2].

Inhalation induction of anaesthesia with sevoflurane would appear to offer several objective advantages over induction with intravenous anaesthesia. Induction with sevoflurane is significantly slower compared to propofol, sevoflurane is associated with a lower incidence of apnea, early resumption of spontaneous ventilation and other induction complications [3]. A study conducted by Cucereanu et al, compared propofol against sevoflurane in patients with anticipated difficult intubation. Results of their study were in favour of sevoflurane induction in terms of oxygen desaturation [4]. Sevoflurane has a blood gas solubility of 0.69 which helps in rapid recovery, less airway irritation and less arrhythmogenic [5]. These properties helped us to consider sevoflurane as anaesthetic agent for induction in cardiac patients with difficult airway.

ASA guidelines for difficult intubation was published with an update in 2013 [6]. Guidelines recommend that patient has to be informed about the procedure and risk of difficult airway. At least one assistant should be available for help. Preoxygenation should be administered before initiating management of the difficult airway. Methods of oxygen supplementation during intubation process should be actively pursued. Before going for intubation the relative merits and feasibility of basic management choices has to be considered. The decision of awake intubation versus intubation after general anaesthesia with preservation or ablation of spontaneous breath has to be compared. In our cases we have chosen general anaesthesia with preservation of spontaneous breaths.

In literature no cases reported using sevoflurane for cardiac patients in induction of anticipated difficult airway. In a series of four cases reported by Kandasamy et al, sevoflurane was used successfully for non cardiac patients including huge thyroid goiter, retropharyngeal abscess restricted mouth opening and foreign body in trachea. There were no complications and no episodes of apnea in their patients [7]. In our cases apnea has not occurred and there was no significant desaturation. Heart rate and invasive blood pressure was maintained stable without significant fall without requiring any vasopressors. In our second case after induction, mouth opening was improved so we had less

difficulty in passing laryngoscope. With our experience, sevoflurane can be considered as agent of choice for induction in cardiac surgical patients with difficult airway. However, more number of studies required for its beneficial effects in difficult airway.

Conclusion

Difficult airway in patients undergoing cardiac surgical patients need special consideration to maintain stable hemodynamics. Sevoflurane with its sweet odour and blood gas coefficient of 0.69 has property of rapid induction and rapid washout from lungs. Property of maintaining stable hemodynamics and spontaneous ventilation made sevoflurane an attractive agent for induction in cardiac surgical patients and we successfully intubated in our patients with difficult airway.

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