

Anesthetic Management in a Pediatric Patient Posted for Bronchoscopy

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Abstract

Anesthetic management in a pediatric patient posted for an impacted foreign body in bronchus is quite challenging, Hemorrhage, Tension pneumothorax during rigid bronchoscopy for foreign body removal is a rare but life threatening complication. We hereby present a case of 3yrs old child who underwent bronchoscopy for foreign body removal from bronchus under general anesthesia where hemorrhage and tension pneumothorax was successfully managed.

Keywords: Hemorrhage; Tension pneumothorax; General anesthesia

Introduction

Foreign body aspiration is the leading cause of mortality in children of 1-3yrs of age groups [1]. Initial presentation of the child with a foreign body is usually with a history of choking episode. The child may present with coughing, wheezing or raspy breathing. Fever and signs and symptoms of a chest infection are typical presenting symptoms in those children who presents more than 24hrs after aspiration [2,3]. A plain x-ray chest has relatively low sensitivity and specificity for inhaled foreign body. The gold standard for diagnosis and management of foreign body in bronchus is rigid bronchoscopy under general anesthesia. Major complications in bronchoscopic procedures are hemorrhage, pneumomediastinum, tension pneumothorax and bronchial lacerations. Early diagnosis and treatment is very essential to have successful outcome in these patients. In the presented case, 3 year old child underwent bronchoscopy under general anesthesia where hemorrhage and tension pneumothorax was successfully managed.

Case Report

A 3 year old male child, weighing 10kg was referred to our institute in view of fever and respiratory distress. He was having recurrent episodes of fever, cough and respiratory distress. Viral markers were negative. Blood test to detect malaria, leptospirosis and dengue were done, but all were negative. X-ray chest was done, which shows left lower lobe consolidation. Ct-scan of chest was done which showed 5mm size intraluminal soft tissue in left main bronchus causing atelectasis of medial basal segment and air trapping in rest of lower lobe. Foreign body was suspected by pediatrician and ENT surgeon and decision was taken to do urgent bronchoscopy in this patient.

On preoperative evaluation, his heart was 136/min, blood pressure was 100/60 mmHg. On auscultation harsh breath sounds were present on both sides. Air entry was decreased on left lower base. Nasal flaring was present. His respiratory rate was 35/min. His hemoglobin was 12gm/dl, TLC were 16000 and all other biochemical parameters were within normal limits. Condition of the patient was explained to the parents and high risk consent was obtained. On arrival in the operation theatre, all standard monitors (ECG/ SpO₂) and non-invasive blood pressure were placed. Child was premedicated with inj.glycopyrrolate 0.004mg/kg, inj.midazolam 0.03mg/kg, inj.fentanyl 2µg/kg, inj.hydrocortisone 2mg/kg. Patient was induced with inj.thiopentone sodium 5mg/kg and after confirmation of mask ventilation, inj.succinylcholine 1mg/kg was given. A 5mm rigid bronchoscope was introduced into the trachea after full relaxation. Anesthesia was maintained on oxygen, air, and sevoflurane (2%) which was given through the side port of the rigid bronchoscope. Small bolus doses of inj.propofol and intermittent succinylcholine were given in between. Foreign body was visualized in left main bronchus. In repeated attempts surgeon was able to hold the foreign body with his forcep but it was getting slipped as it was badly stuck. Finally he hold the foreign body and was trying to remove bronchoscope along with foreign body from the mouth, suddenly frank blood came through bronchoscope and whole throat was filled with blood. Immediately laryngoscopy was performed, but we were unable to see vocal cords as whole throat was filled with blood. Saturation fall upto 50 percent and blood pressure fall upto systolic 70 mmHg. So blindly we put portex uncuffed endotracheal tube size 3.5mm through vocal cords into trachea. Still blood was coming through endotracheal

tube. Saturation improved upto 70%. On auscultation bilateral crepitations were present. Endotracheal as well oral suctioning was done continuously. Simultaneously external jugular vein was cannulated and blood was sent for cross match. 200ml of ringer lactate was infused rapidly to the patient. After few minutes again saturation drops upto 50% with systolic blood pressure of 60 mmHg and heart rate of 150/min. On auscultation there was no air entry on left side and on ventilation resistance was increased. Pneumothorax was suspected and a 14 gauge IV cannula was immediately inserted in the 2nd intercostal space in the midclavicular line. A gush of air leaked out through the cannula and ventilation became smooth. Immediately ICD was inserted on left side by pediatric surgeon. Saturation drastically increased upto 90%. IPPV was continued with 100% oxygen. Air entry was improved on left side of chest. After the bleeding stops from the ETT and good air entry on left side, patient was shifted to pediatric ICU with saturation of 95% and blood pressure of 80mmHg systolic. One packed cell was transfused as the child bled profusely intropoperatively. Patient was sedated and paralyzed and kept on ventilatory support. Postoperative Hb was found to be 10gm%. X-ray chest showed bilateral haziness with ICD in place. Next day Ct-pulmonary angiography was done to rule out any aberrant vessels as the child bled profusely intropoperatively, but Ct-pulmonary angiography was found to be normal. Report also revealed, focal area of consolidation with cavitatory changes noted in basal segment of left lower lobe. Patient was managed on ventilator for 48hrs with systemic broad spectrum antibiotics, nebulisation and intravenous steroid therapy. After 48hrs with improvement in chest condition, patient was weaning from ventilator. On third day of post operative period patient was maintaining saturation of 98% on ventimask and was shifted to the ward.

Discussion

Rigid bronchoscopy is brief but intensely stimulating procedures and presents a challenge for the anaesthetic. In infants and children, removal of airway foreign body is performed under general anesthesia and through a ventilating rigid bronchoscope. Early diagnosis and bronchoscopic removal of the foreign body would protect the child from serious morbidity and even mortality. Good cooperation and communication between the surgeon and the anesthetist is paramount importance in managing a case of bronchoscopy. Aspiration of a foreign body may be a life-threatening emergency in children requiring immediate bronchoscopy under general anesthesia.

A clinical trial of coughing, wheezing and unilateral breath sounds has been shown to have specificity for the presence of foreign body. An assessment must be made of the location, suspected type and degree to which the foreign body is obstructing the airway [4], because these factors influence the approach for removal and thus the anesthesia technique. The choices of inhaled or intravenous induction, spontaneous or controlled ventilation depends upon general condition of the patient and the experience of the anesthesiologists as well as surgeons.

Cohen et.al strongly recommends that once it is established that ventilation is possible, a relaxant technique based on suxamethonium can be used [4]. In our patient suxamethonium was used as a muscle relaxant for induction. One advantage of using a muscle relaxant technique is that the airway is immobilized, which facilitates removal of foreign body. A muscle – relaxant technique also allows the use of balanced anesthesia, which in turn

decreases anesthetic effects on cardiac output. In addition, positive – pressure ventilation may decrease atelectasis, improve oxygenation and overcome the increased airway resistance that occurs when rigid bronchoscopy is used.

Hemorrhage, laryngeal edema and tracheo-bronchial lacerations can occur during ventilating bronchoscopy [5]. Tension pneumothorax is the most serious consequence of rigid bronchoscopy [6,7]. Tension pneumothorax occurs when one way valve mechanism develops because of tracheobronchial instrumentation leading to a rent allowing the air to enter the pleural cavity during positive pressure ventilation but not allowing it to leave during expiratory phase. Due to this mechanism ipsilateral lung gets compressed followed by mediastinal shift and compression of contralateral lung and intrathoracic vasculature which can lead to severe hypoxemia and cardiovascular compromise. So pneumothorax should be suspected when ventilation worsens during rigid bronchoscopy [8]. In our patient tension pneumothorax and hemorrhage occurs, which was treated successfully. Tension pneumothorax was managed by inserting a 14 gauge IV cannula in the 2nd intercostal space in the midclavicular line followed by ICD insertion, while hemorrhage was managed by intravenous fluids and blood transfusion.

Conclusion

Early diagnosis, prompt treatment, vigilant monitoring and good cooperation between the surgeon and anesthetic is very important in managing a case of bronchoscopy in pediatric patient (Table 1).

Hemorrhage: Hemorrhage was managed by Endotracheal intubation → Endotracheal suctioning → External jugular venous cannulation → Intravenous fluids → Blood transfusion
Tension Pneumothorax: Tension pneumothorax was managed by inserting a 14 gauge IV cannula in the 2nd intercostal space in mid clavicular line followed by ICD insertion
Postoperative ventilatory support: for 48 hrs with systemic broad spectrum antibiotics → nebulisation → Intravenous steroid therapy

Table 1 Main Management Steps

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