Case report

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Anesthesia for Lobectomy in a Pediatric Patient` with Cystic Fibrosis: A Case Report

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Abstract

Cystic Fibrosis is the most common autosomal recessive disease which causes a lot of complications and there are some needed operations in lifelong of such patients. Anesthesia in these patients requires particular attention and a full cooperation of surgeon, anesthetist and pediatrician .We reported a case of lobectomy with lung separation in a 4.5 years old child with cystic fibrosis which was performed with minor complications in the hope that an awareness of such situations may turn up similar cases of study.

Keywords: Cystic Fibrosis, Anesthesia, Pulmonic Lobectomy

Introduction

Cystic fibrosis, the most common autosomal recessive disease, is caused by a single mutation in the gene encoding trans-membrane conductance regulator on chromosome 7 resulting in abnormal chloride ion transport in epithelial cells of the lungs, gastrointestinal tract, liver, pancreas and reproductive organs. As chloride transport decreases in these cells, sodium and water transport also decrease causing accumulation of desiccated and viscous secretions in the lumen of the exocrine glands and their destruction and scarring. (1)

Treatment of cystic fibrosis is similar to that for bronchiectasis and is directed toward alleviation of symptoms (mobilization and clearance of lower airway secretions and treatment of pulmonary infection) and correction of organ dysfunction (pancreatic enzyme replacement). These are general principles of treating cystic fibrosis; Clearance of Airway Secretions, Bronchodilator Therapy, Reduction in Viscoelasticity of Sputum, and Antibiotic Therapy (1).

Management of anesthesia in CF:

Management of anesthesia in patients with cystic fibrosis involves the same principles as outlined for patients with COPD and bronchiectasis. Good pulmonary function should be established by controlling infection and improving clearance of secretions before any elective surgery. In case of hepatic dysfunction and malabsorption of fat-soluble

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vitamins, vitamin K should be administered. Maintenance of anesthesia with volatile anesthetics permits the use of high inspired concentrations of oxygen, decreases airway resistance by decreasing bronchial smooth muscle tone, and decreases the responsiveness of hyper reactive airways. Humidification of inspired gases, hydration, and avoidance of anticholinergic drugs is important for maintaining secretions in a less viscous state. Frequent tracheal suctioning may be necessary (1).

Case Report

The patient was 4.5 years old boy that was hospitalized in the internal ward. The patient was a known case of CF with several hospitalizations. The recent hospitalization was due to exacerbation of coughs and dyspnea since 3 days ago. The patient was under treatment with a steroid spray, salbutamol spray and Cefixime syrup. In the preoperative physical examination the patient was alert and orientated, the heart sounds were normal. Airways and mouth was also normal. Roughening in the breathing sounds, especially in expiration and coughing, was heard. The abdomen was normal. Clubbing and exfoliation were seen in extremities. Vital signs were stable. His weight was 13 kg and his height 90 cm. Laboratory data were normal. CT scan with contrast agent revealed bronchiectasis with more severity in apical lobe of the right lung and paranchymal opacities. The patient was scheduled for lobectomy of upper lobe of right lung. After the physical examination, reserving blood and ICU bed for post operation cares and stabilizing of the vital signs, he was transferred to the operating room.

After controlling the cardiopulmonary monitoring and vital signs, induction of general anesthesia was performed with Fentanyl 30 microgram, Midazolam 1 mg, Lidocain 15 mg, and Propofol 60 mg. Anesthesia was maintained with O_2 and N_2O plus Isoflurane: 1-2 %. For one lung ventilation we used bronchial blocking technique using Fogarty catheter. An un-cuffed ETT was cut alongside longitudinally and the patient was intubated using this tube. Later, the tube was passed into the right main bronchus (by auscultation). The Fogarty catheter was introduced to the right main bronchus through the ETT and the ETT was removed after inflating the catheter cuff (the place of catheter was checked by fibrotic bronchoscopy). Then the patient was intubated with another cuffed ETT along the inserted Fogarty catheter. The Endotracheal cuffed tube No 4.5 was used. During operation HR, ECG, SpO_2 and NIBP were monitored. In the first minutes of operation, the vital signs were completely stable but about 30 minutes after thoracotomy, the O_2 saturation began to fall. The place of ETT was checked immediately. In capnography, end-tidal CO_2 was 0. The operation was stopped. Due to insufficient ventilation of the lungs, the patient was extubated. The observation of the ETT revealed that the ETT was clogged with high dense greenish discharges. The patient's ETT was changed for 2 times. Fibroptic bronchoscopy was performed to confirm the ETT place. Intra-tracheal discharges were suctioned 3-4 times. After bronchoscopy No 5 uncuffed ETT was used for the patient and the surgery restarted. After several minutes, $ETCO_2$ began to rise and O_2 saturation simultaneously began to fall, intra-tracheal discharges were suctioned immediately and this condition repeated for several times until the need for suctioning obviated. The patient was extubated awake and delivered to PICU with relatively stable vital signs.

Discussion

Pulmonary involvement in cystic fibrosis (CF) is characterized by recurrent infections from early childhood which may not be presented as a clinically obvious disease (2). It begins primarily in distal airways and results in intra-

parenchymal airways obstruction and parenchymal mechanics derangement (3). The multi modality care and better therapies for CF patients have led to increased survival rate over the past 30 years (4). The most important parts of the care for children with CF are chest physical therapy and techniques for removal of secretions, including manual hyperinflation, chest wall vibrations and drainage of airway secretions. These procedures can be performed when the patient is anesthetized and intubated for minor elective surgeries (5). Considering that there are early therapeutic interventions for the patients with CF and because both inflammatory and functional changes in the lungs occur early in the life of these patients (6), there is the need for simple tests to asses lung function in these patients during early life. To be widely accepted and repeatable, these tests must be applicable to awake non-sedated patients during the first two years of (7). Meconium ileus and intestinal obstruction are the presenting problems in 10 -20% of neonates with CF, requiring an ileostomy and sometimes intestinal resection. The patients with CF usually require multiple surgeries in their lifetime and because of pulmonary disorders in these patients, anesthesia and post-anesthetic period will be extremely difficult and eventful. But surprisingly there are only few reports on this subject in the literature (8). During anesthesia these patients are susceptible to sudden desaturation and decrease in ETCo2 due to complete obstruction of ETT by secretions. Furthermore, lung separation and one lung ventilation will be difficult in these patients during thoracic surgeries and the anesthetist must be excessively vigilant.

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