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Case Report

Anesthetic management of congenital lobar emphysema in a neonate

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respiratory distress, cyanosis, asymmetrical breath sounds, and displaced cardiac sounds. Definitive management requires surgical correction.

Surgical correction has its own risks, which includes anesthetic challenges involving neonates and airway management requiring one lung ventilation during surgery. We are presenting the anesthetic management case of a 22-day-old male child patient who underwent surgery for correction of congenital lobar emphysema under general anesthesia with one lung ventilation and epidural analgesia.

Case report

A 22-day-old male child patient at 38 weeks of post conceptional age weighing 3 kg presented with pallor, central cyanosis, respiratory rate of 70–75/min, blood pressure of 62/54 mm Hg, heart rate of 82/min with sub-costal retractions, breath sounds decreased on the left side and apex beat shifted to the right side. The patient was conservatively managed with oxygen by facemask. With administration of oxygen cyanosis disappeared and oxygen saturation improved from 82 to 96%. The patient had a similar history at 12 days after birth, which was managed at a peripheral hospital as lobar pneumonia. Chest radiograph (Fig. 1) and CT scan confirmed the diagnosis of left upper lobe congenital emphysema. Echocardiogram was done to rule out associated congenital heart disease.

A left sided upper lobe lobectomy was planned and the child was induced with sevoflurane 6–8% and oxygen by facemask without applying positive pressure ventilation.

Introduction

Congenital lobar emphysema also known as infantile lobar emphysema is a condition where air that enters the lungs cannot leave as a result of collapsible bronchus that obstructs the expiration. The disease is characterized by hyperinflation of one or more lobes.¹ Over distension of emphysematous lobe is characterized by expiratory air trapping within the lobe producing compression and atelectasis of adjacent lobes.² The most common lobes affected are the left upper lobe (42%), the right middle lobe (30%), right upper lobe (20%) and both the lungs may also be involved (20%). The age of presentation is usually 4 weeks–6 months of age with incidence being 1 in 20,000–1 in 30,000. Neonates usually present with sudden

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Tracheal intubation was achieved with an uncuffed endotracheal tube of size 3 mm internal diameter which was introduced into left side bronchus by turning the patient's face to right side and 3 French Fogarty catheter introduced and inflated with air to isolate the left lung. Endotracheal tube was brought out and another endotracheal tube of the same size was used for selective right bronchial intubation. During this maneuver oxygen saturation fell upto 85% and then stabilized to 99%. Inj fentanyl (3 mcg/kg) 10 µg IV and Inj atracurium (0.6 mg/kg) 2 mg IV was given and the child was put on mechanical ventilation under pressure control mode. Right femoral arterial line was secured for invasive blood pressure monitoring. Nitrous oxide was avoided to prevent hyperinflation of emphysematous lobe. Epidural catheter was inserted at thoracic (T6) level and 2.5 cm of catheter was left inside and fixed to the skin. A combination of 1.5 ml of 0.125% bupivacaine and 2 mcg/ml of fentanyl bolus was given.

The patient was put in right lateral position, left posterolateral thoracotomy incision was given and surgery commenced with stable hemodynamics. Once lobectomy was done, Fogarty catheter was deflated and pulled out and right endobronchial tube pulled up a little with the tip lying above the carina in the trachea and bilateral controlled lung ventilation commenced.

The patient was electively ventilated for 12 h with continuous dexmedetomidine sedation at the rate of 0.5 µg/kg intravenously and epidural analgesia with 0.125% bupivacaine and fentanyl 2 µg/ml at the rate of 0.1 ml/kg/h was continued for 48 h. Chest radiograph revealed both lung fields inflated (Fig. 2). The patient was extubated without any respiratory depression and was discharged on 8th post op day with stable hemodynamics.

Discussion

The age of onset of symptoms of congenital lobar emphysema ranges from a few days after birth to six months.³ The Incidence in male and female is 3:1.⁴ It usually begins in utero as

ball valve effect of bronchus leading to progressive over distension of airspaces. Etiology remains idiopathic, however in 50% of cases there is evidence of deficient and disordered cartilage. Congenital heart disease (usually patent ventricular septal defects or patent ductus arteriosus) is associated in 15% of cases.⁵ Left upper lobe is most commonly involved and there is a shift of the mediastinum to opposite side because of emphysema on the affected side.⁶

Investigations to diagnose include chest radiograph, CT scan and bronchoscopy.⁷ In this child patient, chest radiograph and CT scan was done to confirm the diagnosis. Lobectomy is the commonest and the definitive treatment. Our patient recovered well and was discharged on the 8th post-operative day.

Pre-oxygenation and induction of anesthesia are the most critical phase in the management of children with CLE. Administration of positive pressure ventilation can increase the amount of trapped gas and worsen the emphysema and mediastinal shift, which can result in cardiovascular collapse during induction.⁸ Therefore the preferred method, would be an inhalational induction and intubation in a spontaneously breathing child. An alternative approach to inhalational induction would be sedation with intravenous ketamine and local anesthetic infiltration at the incision site. In such cases general anesthesia can be administered once intrathoracic pressure is released by surgical incision.⁸ We used sevoflurane, and intubation was performed with the child patient breathing spontaneously. In neonates and infants, the options for lung isolation are either main stem intubation or placement of bronchial blockers.⁹ Since appropriate size of Arndt blocker was not available a Fogarty catheter was used to block the left main bronchus and right-sided endobronchial tube was used for ventilating the right lung. As we did not have pediatric bronchoscope to confirm lung isolation, we used both selective right bronchial intubation and Fogarty catheter to doubly ensure isolation of left lung.

Elective postoperative ventilation is usually required in cases of congenital lobar emphysema with associated congenital heart disease or in cases where other lung is not in good functional state. We extubated after elective

Fig. 1 – Preoperative chest radiograph showing increased translucency of the left lung with mediastinal shift to the right.

Fig. 2 – Immediate postoperative chest radiograph of the child showing post-lobectomy appearance on the left.

postoperative ventilation, to avoid postoperative apnea which is common in preterm infants.¹⁰

Conflicts of interest

All authors have none to declare.

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