Anaesthetic Management of a Paediatric Patient with Mediastinal Cyst

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PRESENTATION OF CASE

A 5-month-old female child weighing 5 Kg presented to paediatrician with complaints of breathlessness, cough and decreased feeding since the age of one month. She had history of recurrent lower respiratory tract infection. There is no significant birth history. The child was asymptomatic one month back, then developed breathlessness, cough and decreased feeding at the age of one month. Later got hospitalised for pneumonia twice in 4 months. After admission and investigation for the above complaints, child was diagnosed with a large mediastinal cyst with left lung collapse and was posted for emergency thoracotomy for excision of cyst.

DIFFERENTIAL DIAGNOSIS

Bronchogenic cyst, neurogenic tumour, vascular malformations, congenital cysts.

DISCUSSION OF MANAGEMENT

Pre-Anaesthetic Evaluation
Active upper respiratory tract infection was present. Child was tachypnoeic with intercostal and subcostal chest in drawing but maintaining saturation with nasal prongs and intermittent nebulisation. On auscultation there was decreased air entry in left lung fields and coarse crepts were present in right lung fields indicating lower respiratory tract infection. CXR showed left lung collapse with mediastinal shift to ipsilateral side. CECT chest showed a well-defined oval cystic lesion measuring 4 cm x 2.9 cm x 2.4 cm in the middle mediastinum causing compression of left main bronchus with left lung collapse and mediastinal shift to left side with compensatory hyperinflation of right lung. No evidence of congenital lobar emphysema. (Figure a and b) Blood investigations were within normal limits.
Preoperative
All the monitors attached. Pulse rate- 180/min, Blood pressure- 90/56 mmHg, RR- 40/min, SpO2 -100% with nasal prong @ 2 lit/min. An ABG was performed preoperatively which showed pH- 7.29, pCO2- 56 mmHg, pO2- 104 mmHg, HCO3- 26.7. Two peripheral intravenous lines were secured and ringer lactate fluid started. Urine output and temperature were monitored.

Intraoperative
Patient was premeditated with injection glycopyrrolate 20 mcg and injection fentanyl 5 mcg intravenously. After preoxygenation with 100% oxygen @ 10 lit/ min inhalational induction was done with sevoflurane 2% concentration maintaining spontaneous respiration. Child intubated with uncuffed endotracheal tube size 3.5 internal diameter which was fixed at 9 cm after confirming bilateral air entry. Patient was maintained on O2: Air 60: 40 ratio and sevoflurane. FIO2 was kept on higher side initially to maintain saturation because we were able to ventilate one lung only.

Surgical Procedure
After induction patient was put in right lateral position for left thoracotomy. Just after positioning patient saturation dropped to 60% followed by bradycardia for which patient was ventilated with 100% oxygen and injection Atropine 100 mcg was given. Child responded to this treatment and saturation and heart rate improved. After thoracotomy and visualisation of cyst (fig c) a bolus dose of muscle relaxant injection Atracurium 2.5 mg given after confirming adequate ventilation. Cyst was dissected without significant blood loss. After removal of cyst haemostasis was achieved and wound closed. Ventilation of left lung improved after removal of cyst. Injection fentanyl 5 mcg was repeated one hour after initial dose. Intraoperative period was uneventful except one episode of bradycardia. Patients vital at the end of surgery were pulse rate -160/min, BP- 86/54 mmHg, SpO2- 98% with 60% fIO2. ABG- pH- 7.28, pO2- 98 mmHg, pCO2- 55 mmHg, HCO3- 25, Hb- 8.7. Patient was shifted to paediatric intensive care unit as it was decided to electively ventilate the patient. Child was extubated next day.

Post-Operative Period
Recovery was uneventful. Child was awake, alert and hemodynamically stable with resolution of skigram (fig d) changes and discharged on the fifth day following surgery.

DISCUSSION
Bronchogenic cysts occur within the spectrum of foregut duplication cysts and arise from abnormal ventral budding of the tracheobronchial tree. Infants may present with respiratory distress secondary to compression of adjacent airway structures. Recurrent infection (of the cyst) may be the presenting complaint in older children.

Mediastinal tumours in children result in significant morbidity and mortality. The incidence of complications related to airway obstruction with the use of GA in patients with mediastinal mass has been reported to be 7% to 18%. These tumours may present as benign cyst or malignant lesion. Among neurogenic tumours lymphoma and mediastinal cyst are most common posterior mediastinal neoplasm and they may occur at any age. Patients with large mediastinal masses are recognised to be at risk of cardiorespiratory failure, so surgery is essential in management of mediastinal masses. Clinically patient with mediastinal cyst present with respiratory distress and frequent chest infections because of the compression on major airway. Respiratory distress become worse in infants due to relatively soft and compliant airways leading to partial collapse and emphysematous chest.

Risk of cardiorespiratory collapse increases under general anaesthesia because of relaxation of bronchial smooth muscles under anaesthesia coupled with effect of muscle relaxant which adds to the risk of compression by decreasing the tone of chest wall. All these factors make anaesthesia for mediastinal masses a challenging situation. Repositioning of the surgery is another cautious step in these patients which can deteriorate the cardiorespiratory compression due to gravitational effect of mass on cardiorespiratory structures. In our case after the right lateral positioning SpO2 dropped and patient had hypoxia induced bradycardia. This reduction in saturation is explained by gravitational effects of the cyst and relaxation of bronchial muscles under effect of anaesthesia giving rise to airway obstruction. Therefore, these patients must be...
placed in appropriate position to reduce compression of the tumour on heart and lungs.

Use of muscle relaxants may result in catastrophic airway obstruction. Hence, spontaneous ventilation should be preferred during induction to preclude possibility of airway collapse under influence of muscle relaxant. relaxant should be given only after ensuring adequate ventilation after induction. In our case we used inhalational induction maintaining spontaneous ventilation and relaxant was given only after ensuring adequate ventilation. Life threatening airway obstruction can occur in immediate postoperative period due to tracheomalacia caused by long standing tracheobronchial compression of mediastinal mass. Atelectasis is also a common postoperative problem. Therefore, vigilance must be maintained throughout the perioperative period.

The perioperative management of patient with mediastinal mass is a challenging situation. So, a detailed preoperative evaluation should be done to assess the cardiorespiratory compromise to predict severity of intraoperative cardiac and respiratory compromise. Maintenance of spontaneous ventilation during anesthesia induction, immediate availability of equipment and manpower to establish cardiopulmonary bypass and carefully planned tracheal extubation are warranted for the patients, who have mediastinal mass with evidence of tracheobronchial compression. Multidisciplinary team approach and standardized protocols are vital for the perioperative care of the patients with mediastinal masses.

REFERENCES


