Case Report

Comprehensive perioperative management of an infant with huge mediastinal mass

ABSTRACT

Anaesthesia induction and meticulous airway management is important in a patient with anterior mediastinal mass. It is all the more challenging if this is encountered in infants. We report a comrehensive successful management of an infant with huge anterior mediastinal mass who was anaesthesized for diagnosis initially followed by surgical resection of the tumor.

Key words: Anaesthesia; infant; mediastinal mass; surgery

Introduction

Anesthesia management of an infant with a mediastinal is extremely challenging. We report a case where we successfully managed an 8-month-old child with mediastinal mass twice; initially, for a diagnostic computed tomography (CT) scan and later for a definitive surgery involving excision of mediastinal lesion.

Case Report

We report a case of an 8-month, 7-kg male child delivered at term via cesarean section. The parents consulted a pediatrician as they noticed recent-onset excessive crying in supine position followed by cyanosis. Chest radiograph revealed a huge mass in the right hemithorax displacing mediastinum to the left in anteroposterior (AP) view and compressing the entire tracheobronchial tree in lateral view [Figure 1a and b]. After optimizing the child with salbutamol nebulisation and steroids, CT scan was planned. The child was afebrile, tachypnoeic (respiratory rate, 40–45/min), heart rate was 130–140/min, pulses well felt in all extremities with no radiofemoral delay. On auscultation, air entry was almost absent in right hemithorax except at the base with normal heart sounds. Oxygen saturation (SPO_2) on room air was 94–95%.

After obtaining an informed high risk consent, CT chest was planned under monitored anesthesia care with sedation. Intravenous (IV) access with 24-G cannula was secured by the pediatrician. Appropriate sized endotracheal tubes, supraglottic airways, laryngoscope, drugs for resuscitation (adrenaline, atropine) were kept ready in the console. After confirming a nil by mouth (NBM) status, we administered 1 mg/kg ketamine IV (7 mg) in mother's arm for sedation and scanning was started in prone position. Oxygen supplementation via face mask at 5 L/min was started with the child breathing spontaneously throughout. Procedure

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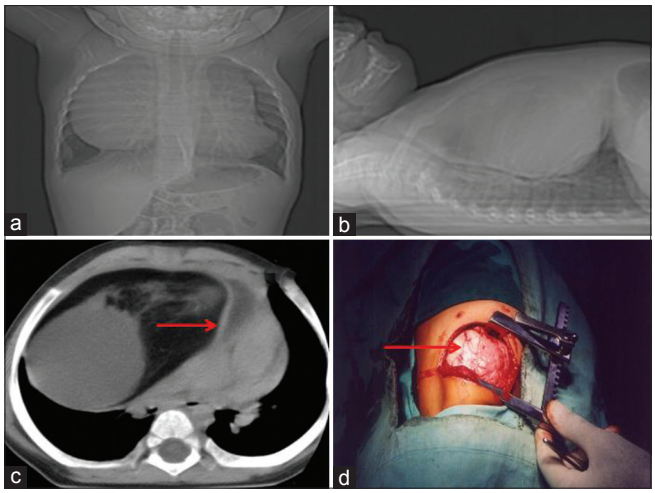

Figure 1: (a) Chest X-ray AP view showing mass occupying entire right hemithorax. (b) Chest X-ray lateral view showing compression of entire tracheobronchial tree. (c) CT chest axial tracheal bronchial compression seen. Arrow shows mediastinal displacement to left due to tumor. (d) Right thoracotomy performed exposing the mass, shown with red arrow

was uneventful. CT scan revealed a huge mediastinal mass which was not compressing the tracheobronchial tree as scan was done in the prone position [Figure 1c]. Surgical excision was planned under general anesthesia (GA) after counselling family members. Risks of bleeding, cardiopulmonary issues, and prolonged ICU stay were explained in detail. After obtaining a high-risk consent, the surgery was posted after 2 days.

On the day of the surgery, 25 mg hydrocortisone was injected IV 30 min prior to induction. Premedication was done with 0.05 mg glycopyrrolate and 1 mg/kg ketamine. The child was shifted to the OR in prone position and standard monitors (ECG, NIBP, SpO_2) were attached. Surgeons were ready for emergency thoracotomy and a 3-mm rigid bronchoscope was also ready in an event of severe desaturation resulting from mass effect. GA was induced with oxygen: nitrous oxide with isoflurane which led to several episodes of desaturation (lowest of 82%), which improved with assisted ventilation. After 10 min, the child was intubated with 3-mm internal diameter flexometallic endotracheal tube. Ventilation was assisted and air entry confirmed on auscultation; 2 μg/kg fentanyl was administered IV. The child was then positioned for a right thoracotomy in left lateral position which led to increased airway resistance and desaturation (lowest SPO_2 of 70%). Immediately a thoracotomy was done with assisted ventilation and the mass was pulled away from tracheobronchial tree which led to improvement in ventilation and oxygenation.

During excision, there were several occasions of inability to inflate the lung due to compression of the tip of ETT and the mass distorting the trachea lumen. Eventually, a complete excision was possible [Figure 1d]. Neuromuscular blockade (NMB) was achieved with atracurium 0.5 mg/kg body weight once the mass was resected. Right thoracic paravertebral block with 3 ml 0.25% bupivacaine was administered for the postoperative pain relief. NMB was reversed with IV neostigmine 0.05 mg/kg and 0.01 mg/kg atropine followed by tracheal extubation in OR. The infant was shifted to the ICU with oxygen via face mask. Child received paracetamol syrup 200 mg every 8 hours orally for postoperative analgesia and 2 mg dexamethasone every 8 hours for 24 hours. The entire postoperative course was uneventful and the child was discharged after 5 days.

Discussion

Administering anesthesia to a child with anterior mediastinal mass is extremely challenging. Severe cardiovascular and/or respiratory collapse may occur during induction of anesthesia and can have undesirable outcomes despite expeditious use of all appropriate resuscitative manoeuvres. Anesthesiologist should review the CT scan in detail and try to understand the compression that the mass is causing, as it can help in planning anesthesia. A discussion with the surgeon and radiologist can give a lot of information. Adequacy of ventilation during GA and the tracheal cross-sectional area can be estimated from the CT scan. The presence or extent of symptoms does not correlate well with the degree of tracheal narrowing shown by CT scan except for orthopnea.[1] Less than 50% of the normal predicted tracheal cross-sectional area is associated with significant anesthetic complications.

A 35% decrease in the diameter of tracheobronchial lumen is associated with respiratory symptoms. A greater than 50% decrease may be associated with complete airway obstruction during induction or emergence from GA.[2] Clinical presentation of childhood mediastinal masses is often nonspecific or incidental. Patients can be asymptomatic and can go undetected. In such cases, ambulatory anesthesia for even a lymph node biopsy may prove fatal.[3] Severe cardiovascular and/or respiratory collapse may occur following induction of anesthesia in a patient with critical mediastinal mass syndrome (CMMS).[4] The outcome may be fatal despite expeditious use of all appropriate resuscitative manoeuvres. CMMS in infants are identified by factors such as anterior mass, lymphoma, superior vena cava syndrome, vessel compression or displacement, pericardial, and pleural effusion. Cardiac tamponade and superior venacaval syndrome are known complications of anterior mediastinal masses.[5] Tumor enveloping the heart and infiltrating the pericardium can lead to refractory cardiovascular collapse under GA.[6]

Preoperative cardiac assessment by ECG and echocardiography in such infants can provide lot of information. Availability of femoro-femoral cardiopulmonary bypass in symptomatic patients before induction of GA in these patients is suggested.[7] In cannot ventilate situation, an immediate laryngoscopy and splinting of trachea or an emergency bronchoscopy to counteract the mass effect on the tracheobronchial tree is recommended.[8] An elective postoperative ventilation for 12–24 h usually helps in stabilizing the pulmonary functions.

Conclusion

A thorough clinical examination, understanding of scans and rapid decision making is important while managing a child with mediastinal mass coming for surgery. Situations aggravating and relieving respiratory compromise should be elicited. Surgical team should be ready for a rapid thoracotomy if there is total tracheobronchial obstruction during induction to relieved compression. The child should be managed in a dedicated pediatric unit with backup for ICU care and ventilation.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patients parents have given their consent for his/her/their images and other clinical information to be reported in the journal. The patients family understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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