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Case Report

Role of Anaesthesiologist in the management of Pericardial Mass in one month old child

Lulu Fatema Vali[*1] and Apeksha A Bhure[2]

[1]*Associate Professor,* [2]*P. G. Student,*
Department of Anaesthesia, Government Medical College and Superspeciallity Hospital, Nagpur, Maharashtra, India

QR Code

***Correspondence Info:**
Dr. Lulu Fatema Vali
Associate Professor,
Department of Anaesthesia,
Government Medical College and Superspeciallity Hospital,
Nagpur, Maharashtra, India

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Abstract

A large pericardial mass compressing lower trachea and main bronchi was diagnosed in 1 month old baby who presented with dyspnea and cough. Anticipating potential danger of airway collapse during general anaesthesia management of such patient is discussed. Cardiopulmonary bypass was kept ready. Large mass from right side of pericardium was removed. Child recovered uneventfully.

Keywords: Mediastinal mass, Airway Compression, Anaesthesia.

1. Introduction

Management of airway problems posed by mediastinal masses that were too in pediatric age group provide some of the greatest challenges faced by anaesthesiologists. Mediastinal masses are most commonly found in anterior mediastinum (56%) and less frequently in middle mediastinum (19%). Incidence of mediastinal masses varies in pediatric and adult patients. In children with mediastinal masses, neurogenic tumors (35%), lymphomas (25%), germ cell tumors (10%) and primary cysts (16%) were diagnosed most frequently. Amongst primary cyst, pericardial cysts are the second most frequently encountered cysts within the mediastinum. These cysts can be managed with needle aspiration and follow up with serial CT. Surgical excision of pericardial cysts is indicated primarily for diagnosis and to differentiate these cysts from malignant lesions.

2. Case Report

One month old male baby admitted with chief complaints of moderate to high grade fever, associated with cough and breathing difficulty from last 7 days. There was no history of change in quality of voice or cry, no history of cyanosis or facial edema. Baby was a full term, vaginal, uncomplicated hospital delivery. Mother is known cases of seizure disorder, on Tab Valproate 200 mg OD since last 2 yr. She had continued it in antenatal period also. Valproate does not have any teratogenic effect.

On examination baby was conscious, restless, tachypnoeic and febrile. Pulse rate 148/min. respiratory rate 42/min. intercostalindrawing was present. Trachea was not deviated. No cyanosis, edema face. Air entry grossly reduced over right midzone and lower zones and generalized crepitations were present. Heart sounds were muffled. Further clinical examination was unremarkable. Laboratory investigations include weight = 3.5 kg., HB = 9.8 gm%, HCT = 34.4%, increased polymorphoneucleocyticcoun. Blood group 'A' positive, Blood sugar = 101 mg%, X-ray chest showed cardiomegaly. 2D Echo: - Mild pericardial effusion with large intrapericardial cystic mass on right side. No evidence of temponade.

To trace the origin of cyst and to assess airway CT scan thorax was done. Plain and Contrast study showed large ill-defined heterogenous mass in pericardial cavity on right side, predominantly cystic with central solid component (4.5x3.4x3.2 cm). Anteriorly mass was reaching up to chest wall, postero-inferiorly indenting right atrium, superiorly reaching upto aortic, laterally abutting pericardium of right side while posteromedialy in close relation to SVC ascending aorta and right pulmonary trunk. Moderate pericardial effusion was present. Lower part of trachea, carina and proximal part of main brinchi were compressed. Consolidatory changes were seen in both apical lobes and medial and lateral basal segment of right lobe.

Patient had received appropriate antibiotic s and mebulization therapy for chest infection. After obtaining informed written consent the patient was scheduled for medium sternotomy resection of tumor. Baby was brought inside operation room with adequate precautions taken to prevent hypothermia, Preoxygenated with 100% O2 on mask and premedicated with Inj. Dexamethasone 1 mg, Inj. Midazolam 0.05 mg IV and Inj. Fentanyl 5ug. SpO2, ECG, Temperature, NIBP and ETCo2 monitored intraoperatively. Before intubation femoral artery cannulation was done and standby femoro-femoral bypass was kept ready.

Patients were induced on inhalational anaesthetics, O_2+N_2O+ Isoflurane supplemented with Inj. Ketamine 5 mg IV. Without any difficulty patient was untubated with plain portex Endotracheal 3.5 no. tube. Anaesthesia maintained on oxygen + Nitrous oxide and traces of isoflurane (0.2-0.4 %) on assisted ventilation with JR modification of Ayres "T" piece. Central venous line secured though right internal jugular vein of size 4 Fr, 8 cm, CVP was 7 cm. Median sternotomy done. Moderate pericardial effusion sucked out. Mass separated from right wall of heart and ascending aorta. A short episode of bleeding occurred, which required crystalloid and 80ml of compatible blood transfusion. Blood pressure and other vitals were maintained.

At the end of surgery patient was given left lateral position. Epidural catheter No.20G passed through No-18 needle via caudal space. Catheter inserted till 14cm, initial analgesic dose was given with 3ml of 0.125% Bupivacaine. There was no episode of any airway obstruction or hypoxia. Patient shifted to Recovery Room with ETT and epidural catheter in situ. Oxygen supplementation was given on 'T' piece. Patient extubated after 3hrs as patient's respiration was adequate and all vital parameters were stable. Epidural catheter was kept in situ for 48 hrs and patient received analgesia 8hrly with 3ml of 0.125% Bupivacaine. Histopathological examination revealed the mass to be a mature teratoma.

3. Discussion

General anaesthesia in a child with mediastinal mass can complete the obstruction of trachea and main bronchi possibly resulting in irreversible respiratory failure. This risk is directly linked to the degree of lumen amputation of the trachea usually evaluated on CT scan. There is risk of accident if degree of lumen amputation is greater than 30%. Cysts (bronchogenic, pericardial) are most common masses in middle mediastinum. But as the tumour enlargers it will occupy more than one compartment of mediastinum and compresses different vital structures. Infants are more likely to present early with symptoms and signs because of relatively small space in mediastinum.

Our patient was 1 month male baby 3.5kg who had lower tracheal and main bronchi compression and early consolidating changes in the lung. He presented with tachypnea with distress, cough and fever. Neck veins were not engorged no facial puffiness or hepatomegaly suggestive of any venous compression (S.V.C. Syndrome). As airway compression was main concern, patient was intubated with direct laryngoscopy without muscle relaxation in supine position; Pediatric fiberoptic bronchoscope was not available with us. Ketamine was preferred as induction agent because it has minimal effect on central respiratory drive and it is suitable when spontaneous ventilation is required. Patient maintained on assisted ventilation and muscle relaxation was avoided as it would have precipitated sudden and irreversible airway obstruction. Central venous line installed to measure CVP and for IV access intraoperatively and postoperatively. Epidural analgesia provided for adequate pain relief which prevented possible ventilatory restrictions and postoperative pulmonary complications.

In patients with mediastinal mass GA may be required for diagnostic procedure (biopsy) or definitive surgery. Regional anaesthesia is normally first choice if feasible. In some cases it could be possible to reduce the size of tumor with chemotherapy and or radiotherapy. The mechanisms responsible for tracheal compression by mediastinal masses during GA may include – the effect of anaesthesia on pulmonary mechanics , the supine body position, the elimination of glotlic regulation of airflow by endotracheal intubation, changes related to surgical manipulation of tumor itself, the size and location of mediastinal mass, the young age of patient and preexisting airway disease. Bronchial smooth muscles are relaxed under GA and the compressibility of airways increases which exacerbate effect of extrinsic compression. These effects are more profound in infants as airway of infant is highly compliant, poorly supported by surrounding structures, ribs provide little support to lung, so negative intrathoracic pressure is poorly maintained. Thus, each

breath is accompanied by functional ciosure of airway. Also fatigue resistant muscle fibers of type-I variety are very few in number in diaphragm and intercostais muscle of an infant so they get easily exhausted and prone to respiratory failure.

All patients require a meticulous preoperative assessment including careful history and physical examination aimed at delineating signs that may indicate airway, great vessels or heart compression. In middle mediastinal masses 2D Echocardiography carries special importance because it delineates any tomponade effect, nature of tumor and guide for needle biopsy. Fiberoptic bronchoscopy evaluates dynamic airway obstruction and is also helpful for intubation in awake patient.

Life threatening complication can occur at any point during anaesthesia for patient in mediastinal mass, so alternative techniques for maintaining oxygenation should be kept available such as different tubes, microlaryngeal tubes, rigid bronchoscope (important in event of tracheal /bronchial collapse). Helox (80-20)-Helium-oxygen gases mixture and cardiopulmonary bypass with extra-corporal oxygen supply. Especially in extensive compression of airway preoperative canulation of femoral vessels recommended for femoro-femoral bypass. Helox reduces pressure needed to ventilate the patient with small airway or partially obstructed airway as its density is 1.805 times less than pure oxygen. This helps in preventing hypoxia.

Change of position to lateral or prone may be necessary if airway is “lost” under anaesthesia, to reduce the compressive effect.

4. Conclusion

In mediastinal mas surgeries, if possible treat under local anaesthesia. Reduce the size of tumor by preoperative chemotherapy or radiotherapy. If GA is required, assess airway preoperatively, intubate patient white awake. Maintain GA on spontaneous ventilation avoids muscle relaxation.

In pediatric patient utmost care has to be taken to keep airway patent and maintain oxygenation.

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