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ANESTHETIC MANAGEMENT OF ANTERIOR MEDIASTINAL MASS IN 7 YEARS, OLD CHILD POSTED FOR DIAGNOSTIC BIOPSY

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Abstract:
Background: Anterior mediastinal mass can lead to life threatening airway compression and impingement on heart and great vessels. Mortality is high, especially in children, due to pliable rib cage and difficulties in symptomatic assessment preoperatively. Respiratory symptoms include dyspnea, orthopnea, cyanosis, cough, wheeze, and stridor. Cardiovascular symptoms include syncope, headache, and facial swelling that worsens with Valsalva, and on physical examination jugular venous distention, facial/neck oedema, blood pressure changes with postural changes, and increased pulsus paradoxus.
Case report: We reported a case of symptomatic 7years old male child with a radiographic finding of a mediastinal mass posted for diagnostic biopsy and discuss the anesthetic management for the same.
Conclusion: It appears prudent to avoid general anesthesia, when possible, for patients at the highest risk. When general anesthesia is required, a comprehensive plan must be formulated preoperatively with the surgical team.
Key Words: Mediastinal mass, Airway compression, General Anesthesia

Introduction

Mediastinal masses consist of a heterogeneous group of both benign and malignant tumors. Most of these can present with formidable challenges[1] and, can cause life threatening perioperative morbidity and mortality by causing major airway and vascular compression and are more exacerbated when under general anesthesia[2,3]. Numerous fatal or near fatal complications associated with anesthesia for patients with anterior mediastinal masses have been reported[4,5]. Understanding the nature of the mediastinal mass in relation to vital structures, its pathophysiology, careful preoperative assessment of the patient, discussion with the surgeon, and being prepared for management of cardiorespiratory

complications related to compression of the trachea and vascular structures are key to successful management.

CASE HISTORY

A 7 years old male child came to causality with chief complaints of chest pain, cough, breathlessness for 10 days with left side ICD in situ. Patient was apparently alright 10 days back when he developed chest pain, cough, fever with mild breathlessness. For this complaints patient showed to local doctor and diagnosed with left side pleural effusion. Patient was started on prophylactic AKT and left side ICD was inserted. Multiple times pleural tapping was done and 1-pint pcv transfusion done in outside hospital. Later shifted to tertiary care centre for further evaluation. Patient was shifted to ward with oxygen saturation of 94% on room air. Further blood investigation done and in USG thorax reported as moderate left sided pleural effusion (approx. volume 300-400cc) and right side pleural effusion (approx. volume 200-250cc). HRCT thorax reported as large bilateral (left>right) para and prevertebral mass lesion extending from supra renal region till the level of carina measuring about 14X7X8 cm, causing significant displacement of left lung, left hemidiaphragm, right anterolateral displacement of the heart. Anterior displacement of trachea , aorta and right main bronchus-neoplastic in origin. Moderate left sided pleural effusion. Collapse- consolidation of the left lower lobe. Mild Right sided pleural effusion. Mild to moderate pericardial effusion with maximum thickness of 12 mm. multiple enlarged lymphnodes-? metastatics. 1. Mediastinal- pretracheal, bilateral paratracheal, subcarinal, largest measuring about(23X30X25mm) , 2. Left axillary region (23X21mm), 3. Retroperitoneum- preaortic, paraaortic, aortocaval(largest rt paraaortic 30X35mm), 4. Left juxta diaphragmatic 18X15mm.Pleural tapping was done and sent for CBNAAT, it came negative. Cervical biopsy AKT was stopped. After one day in ward patient started desaturating, shifted to PICU and kept on HFM with 15lit of Oxygen.

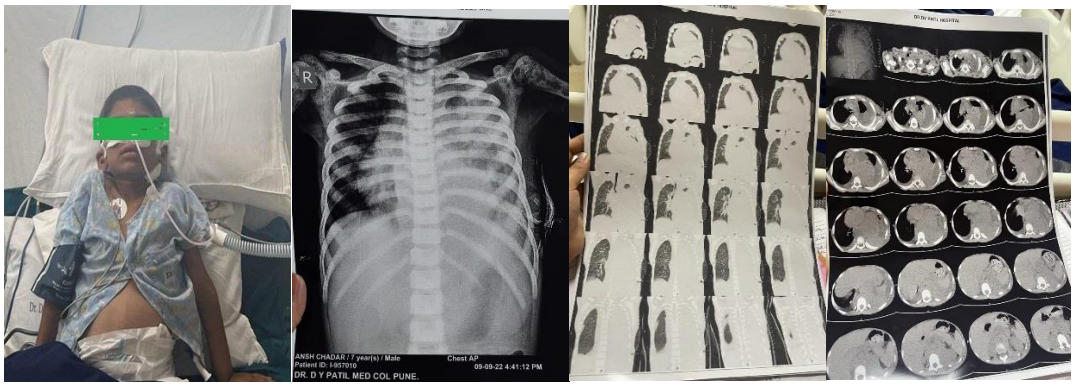

Fig.1. preoperative patient on HFM, Fig 2. Chest X-ray, Fig 3&4 HRCT Thorax

Due to the proximity of the mass to major vessels it was decided that the procedure would be performed under spontaneous general anaesthesia. After confirming consent and NBM status, routine monitors recommended by American Society of Anesthesiologists (ASA) were attached along with a patent I.V access. All arrangements for emergency intubation were set. The patient was administered inj. glycopyrrolate 0.004mg/kg and injection Kitamine 10mg intravenous was given once patient was taken inside the operation theater. Patient was kept on manual spontaneous with sevoflurane at 1 dial. The patient was sedated with graded doses of propofol, with sevoflurane dial set at 1.0 and was aided by analgesics like fentanyl (1 μg/kg) such that the patient was maintained on spontaneous respiration and the patient was given a 45^0 head up position for the comfort of patient and interventional radiologists for tru-cut biopsy. Local infiltration was given with 2% lignocaine. The three shots with the biopsy gun were uneventful. Once the biopsy was taken all inhalational was turned off. Gave

100% oxygen to the patient. Once the patient was fully awake put him on oxygen with Hudson mask and shifted to PICU back with all monitors attached.

Discussion

Mediastinal tumours are not uncommon in paediatric population and often pose a diagnostic challenge. They include a variety of entities including developmental, inflammatory, infectious and neoplastic; most are malignant. These lesions can be classified based on imaging according to the specific compartment (anterior, middle and posterior), generating a focused differential diagnosis. This combined with a rational, clinically oriented approach based on patient's history, focused physical examination, age, gender, symptoms, signs, anatomic localization, imaging characteristics and laboratory investigations including tumor markers paves way to a presumptive diagnosis guiding additional and prudent investigations[5].

The anterior mediastinum is bounded anteriorly by the sternum, the middle comprising of the heart and great vessels posteriorly with the thoracic inlet and the diaphragm forming the superior and inferior limits. Benign or malignant, Anterior mediastinal masses can arise from the thymus, thyroid, lung, and variety of other tissues. As the mass enlarges, the surrounding vital structures such as the trachea or mainstem bronchi, esophagus, superior vena cava, recurrent laryngeal nerve and heart get compressed resulting in the emanation of a variety of clinical signs and symptoms such as cough and dyspnea; SVC syndrome; dysphagia; hoarseness; cardiac tamponade with syncope or postural symptoms respectively[6]. Furthermore, patients may also present with the symptoms that may arise from the systemic effects of the mass or from the pathology associated with these masses.

Positional dyspnea or orthopnea and stridor are the potential debilitating signs that may predict the degree of tracheal compression[6], pulmonary function abnormalities[7] and hence increase the chances of perioperative complications[7-10]. Adequate pre anesthetic planning is of utmost priority If postural symptoms are identified, to define the position(s) in which the debilitating symptoms are reduced to a minimum.

After confirmation an anterior mediastinal mass on chest radiography, CT scan of the chest is required to determine the location and extent of the mass. If the radiography depicts pericardial effusion or compression of the heart or a major vascular structure a 2D Echo is indicated to define the effect on cardiovascular function[11,12].

The perioperative plan should be multidisciplinary in nature involving not only the anesthesiologist, but also the surgeon, and intensivist. The loss of spontaneous ventilatory respiratory efforts reduces the trans pleural pressure gradient which, under normal circumstances, distends the intrathoracic airways and thereby preventing airway collapse and especially during expiration when the pleural pressures rise and hence further worsen airway compression. Moreover, the Positive pressure ventilation supplied during general anesthesia adds to the intrathoracic pressure.

In this case report the patient has been posted for biopsy. So further discussion will be aimed at anesthesia for diagnostic procedures. Lymphoma, neuroblastoma, and other malignancies present as mediastinal masses that do not require any surgical intervention and hence the anesthesiologist is routinely faced with challenges to provide a safe aesthetic for biopsy. It is of prime concern that the anesthesiologist be involved in the decisions regarding risks and benefits of possible biopsy strategies and approaches. For moderate to high-risk patients, the avoidance of general anesthesia especially with the usage of muscle relaxants is a reasonable goal unless the anesthesiologist runs out of option. Percutaneous needle biopsy using imaging nullifies the need of surgical biopsy in most cases.

Continuous Maintenance of spontaneous ventilation through an endotracheal tube should be ensured while acquiring anesthesia suitable for the surgical plane. Intravenous agents such as dexmedetomidine and ketamine, have excellent analgesic and sedative properties with minimal respiratory depression. All emergency airway maneuvers should be at disposal in event of difficult ventilation prior to handling of the mass. Measures such as rapidly awakening, shifting the patient to a

pre-planned ‘‘rescue’’ position, or utilizing rigid bronchoscopy for ventilation should be advocated at the earliest to prevent any airway compromise.

Conclusion:

Administering anesthesia for patients with anterior mediastinal masses continues to be a major challenge for any anesthesiologist which also includes Identifying patients at high risk for airway occlusion and cardiovascular collapse under general anesthesia. Diagnostic procedures should be undertaken under local anesthesia minimal sedation wherever possible. Understanding the relation of the mediastinal mass to vital structures, careful preoperative assessment of the patient, discussion with the surgeon, and careful planning and preparation for perioperative complications related to compression of the major airways and vascular structures are key to successful management.

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