ANAESTHETIC MANAGEMENT OF A PATIENT WITH MEDIASTINAL TUMOUR POSTED FOR TUMOR EXCISION

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ABSTRACT

Mediastinal masses can compress major airways, so patients with this condition should be evaluated carefully before subjecting them to anaesthesia. There have been many reports of hemodynamic and airway collapse induced by general anaesthesia in patients with an anterior mediastinal mass. Bronchial carcinoids which account for 0.5% to 2.5% of all the lung malignancies may have the unusual presentation of an anterior mediastinal mass. Carcinoid tumours pose a great challenge to the anaesthesiologists especially if carcinoid syndrome is present. We report the case of a 30-year-old gentleman who presented to us with persistent cough, diagnosed to have a large anterior mediastinal mass and was posted for debulking of the same. It was suspected to be a bronchial carcinoid intraoperatively and pneumonectomy was done and the histopathological diagnosis confirmed in the postoperative period.

KEYWORDS
Mediastinal tumor, double lumen tube.

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INTRODUCTION: Mediastinal mass syndrome, described by Bittar and colleagues in the 1970s, is associated with significant risk for perioperative morbidity and mortality that continues to be a challenge for an anaesthesiologist.[1] Mediastinal masses can compress the major airways, so these patients should be carefully evaluated before subjecting them to anaesthesia, as the size of the tumour does not correlate with the clinical symptoms of airway compression and the development of airway collapse after induction of general anaesthesia.[2] Anterior mediastinal masses may be benign or malignant and may arise from the thymus, thyroid, lung, airway, pleura, pericardium, lymphatic, and other tissues of which thymoma is the second most common mediastinal mass encountered.[3] Bronchial carcinoids are foregut tumours and approximately 70% are located in major bronchi and accounting for 0.5-2.5% of all lung malignancies.[4,5] They often present in a similar way to other lung tumours and are usually perihilar and present with recurrent pneumonia, cough, haemoptysis and, very occasionally, chest pain.[6] Anaesthetic considerations in patients with carcinoid tumour and carcinoid syndrome include prevention of mediator release, avoiding triggering factors and preparation for the management of peri-operative carcinoid crisis.[7]

We report the successful anaesthetic management of an adult patient who presented to us with diagnosis of anterior mediastinal tumour proposed to be thymoma or germ cell tumour posted for debulking of mediastinal mass, which was suspected to be bronchial carcinoid intraoperatively and left pneumonectomy was performed.

CASE SUMMARY: A 30-year-old male presented with a one month history of cough, which was more in supine position. He was comfortable while in the sitting and lateral position. There was no history of stridor or noisy breathing, facial edema or flushing, chest pain, breathlessness, cyanosis or wheezing. His past, personal and family histories were insignificant. On general physical examination, patient was conscious and afebrile with pulse rate of 78 beats/min, blood pressure of 120/70 mmHg. Cardiovascular and respiratory system examination did not reveal any significant findings. His airway examination revealed adequate neck extension, with mallampatti grade 2, normal dentition and spine, and adequate mouth opening. All his laboratory investigations and 2D echocardiogram were within normal limits. Neck x-ray showed mild compression on left bronchus. CT chest revealed a large mediastinal tumor 9x6cm in anterior and middle mediastinum and protruding into left perihilar region, compressing left lobe bronchus causing partial obstruction and hyperinflation of left lung. After further clinical and radiological evaluation, he was diagnosed to have large anterior mediastinal tumour which was

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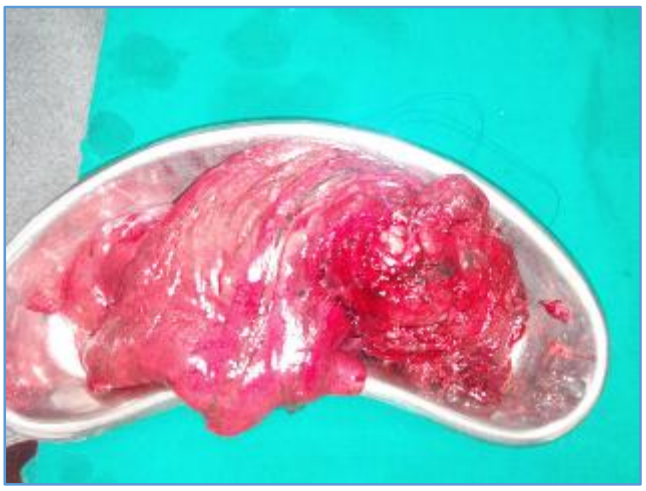
suspected to be thymoma or tumour of germ cell origin and was posted for tumor excision.

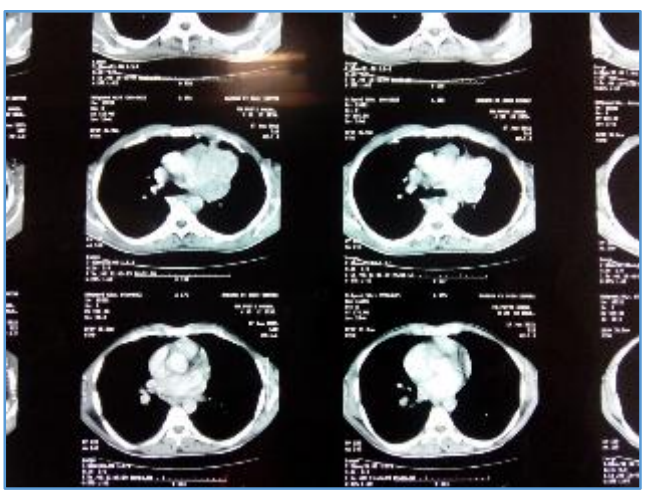
Patient was explained about the anesthetic procedure and informed written anesthesia consent was obtained. Our plan of anesthesia was general anesthesia with endotracheal intubation by induction with inj. propofol and inj succinyl choline and maintenance with inj vecuronium and halothane. The patient was premedicated with tablet Ranitidine 150 mg and tablet Anxit 0.5mg on the day prior to surgery. On the day of surgery a thorough cockpit drill of the anesthesia machine was performed. Anticipating difficult airway, difficult airway cart was kept ready which consisted of, two working scopes with appropriate size Macintosh blades, Laryngeal mask airways (LMA), proper fitting masks, stylet and appropriate size oral and nasopharyngeal airways. All emergency drugs were kept ready and arrangements were made for emergency defibrillation, along with other resuscitation equipments.

Patient was shifted on operating room table, and two wide bore intravenous (IV) access were secured and IV fluids were started. Monitors were connected and baseline values of heart rate, blood pressure and room air saturation were noted. Patient was then preoxygenated with 100% oxygen at 10L per minute flow rate, for 3 minutes and premedicated with Inj. Glycopyrrolate 0.2mg, Inj. Midazolam 1mg and Inj. Fortwin 30mg IV. Induction was done with Inj. Propofol 100mg IV. After confirming adequacy of bag and mask ventilation, endotracheal intubation (ETI) was facilitated with Inj. Succinyl choline 75mg IV. When adequate muscle relaxation was achieved, trachea was intubated with a double lumen endotracheal tube (right sided), under direct laryngoscopy. Position was confirmed by bilateral equal air entry and presence of EtCO2, and tube was fixed. Patient was maintained with O2: N2O of 3:5, Halothane 0.4% to 0.8% intermittently, Inj. vecuronium in incremental doses and intermittent positive pressure ventilation with Bain's circuit. The EtCO2 was maintained between 35 and 40 intraoperatively to avoid hypocarbia or hypercarbia. Intraoperatively the surgeons found that the tumour was extending into the left bronchus and suspecting it to be a bronchial carcinoid, decided to perform a left pneumonectomy, and was managed accordingly.

The patient also had an episode of tachyarrythmias intraoperatively, due to surgical manipulation, which subsided with Inj. Xylocard 100mg IV. Oxygenation remained satisfactory with a SpO2 of 98–100%. The blood pressure fluctuated between 90/40 and 140/70mmHg, which was managed with intravenous fluids and blood transfusion. Following the surgical procedure, patient was reversed with Inj. Neostigmine 2.5mg + Inj. Glycopyrrolate 0.5mg IV and gentle oral suctioning was done. The patient was successfully extubated and shifted to the post anaesthetic care unit for observation and close watch was kept on the vital parameters, especially the SPO2, which were found to be in the normal range. The tumour was subjected to histopathological examination postoperatively and the diagnosis of bronchial carcinoid was confirmed. Further postoperative period was uneventful and subsequently, the patient was discharged home.



Tumor removed in toto



ct scan picture of tumor

DISCUSSION: Mediastinal masses are the tumours of mediastinum, of which more common are located in the antero-superior part, which cause compression of major airways and need a thorough and proper evaluation by an anaesthesiologist. The natural history of mediastinal masses varies from those that are asymptomatic or benign (54%) to those that have aggressive symptoms or are invasive neoplasm (15%) resulting in death,[8] and adults when compared to pediatrics are less prone to perioperative complications.[9,10] By nature of their anatomical location, they produce three problems: compression of the heart, compression of the large vessels (principally the superior vena cava) and compression of the trachea and main bronchi.[11] Presenting features in a patient with mediastinal mass depend upon the pressure effects on the surrounding structures. Compression of the trachea or mainstem bronchi may result in cough and dyspnea; involvement of the superior vena cava (SVC) may result in SVC syndrome; compression of the esophagus leads to dysphagia; impingement of the recurrent laryngeal nerve causes hoarseness; and direct compression of the heart, with or without an associated pericardial effusion,

may result in cardiac tamponade with syncope or postural symptoms.[3] Symptoms may also arise from the systemic effects of the mass or from the disease process associated with such masses.[12] Symptoms of Horner's syndrome (ptosis, miosis, anhydrosis, apparent enopthalmos, absence of pupillary dilatation on shading the eye and abolition of ciliospinal reflex), hoarseness and severe pain are often indications of malignant pathology.[13,14,15]

Amongst the structures that can be compressed, compression of the airway viz., trachea, main bronchi is of primary concern to the anaesthesiologist. Hence these patients should be carefully evaluated before subjecting them to anaesthesia, as the size of the tumour does not correlate with the clinical symptoms of airway compression and the development of airway collapse after induction of general anaesthesia.[2] The incidence of complications in patients with mediastinal masses, symptomatic or asymptomatic patients, on induction of general anaesthesia has been reported to be 7% - 18%. Induction of general anesthesia leads to extrinsic airway compression by various mechanisms, viz.

a) Reducing the FRC by 20%
b) Loss of normal transpleural pressure gradient because of loss of diaphragmatic movement.
c) Relaxation of tracheobronchial smooth muscles leading to enhancing extrinsic compressibility.
d) Increase in tumour blood volume and size because of supine position.

In the presence of severe symptoms of cardiorespiratory compression such as, positional dyspnea, orthopnea, stridor, syncope, superior venacava syndrome (SVCS) and in profound hypoxia due to compression of great vessels administration of GA may be fatal. CT and MR scans of the chest provide more accurate information about the relation of mediastinal mass and its effects on the tracheobronchial tree by compression or invasion, [8] and are recommended before administering general anaesthesia for such cases.

Carcinoids are neuroendocrine tumours derived from enterochromaffin cells and are capable of secreting bioactive substances, most importantly serotonin, histamine and kinin peptides. In 1907 Obendorfer first described this tumour as "karzinoid" because it "resembled carcinoma" but was noted to be slow growing.[7] Carcinoid tumours arise from the different embryonic divisions of the gut. They depend for their frequency of occurrence on the site density of neuroendocrine cells. Hence, foregut tumours arise in the lungs, bronchi, or stomach; midgut carcinoid tumours occur in the small intestine, appendix, and proximal large bowel; hindgut carcinoid tumours arise in the distal colon or rectum. As a group, carcinoid tumours represent a wide spectrum of neuroendocrine cell types. Under electron microscopy, they typically contain numerous membrane-bound neurosecretory granules composed of hormones and biogenic amines.[6]

Recent epidemiology suggests that carcinoid tumours may be increasing in frequency with the highest incidence in some racial groups (4.5 per 100 000 in African males), suggesting a genetic role associated with their development. The sites of highest incidence are the gastrointestinal tract (67.5%) and the broncho-pulmonary system (25.3%). Within the gastrointestinal tract, approximately 40% of tumours occur in the small intestine, with a further 27% in the rectum and 10% in the stomach.[6] Bronchial carcinoids are foregut tumours and approximately 70% are located in major bronchi and accounting for 0.5-2.5% of all lung malignancies. These occur more frequently in the right lung especially middle lobe. The annual incidence has been reported to be 0.6/100000 population. Approximately 2-5% of bronchial carcinoid tumours exhibit symptoms of carcinoid syndrome.[7] They often present in a similar way to other lung tumours and are usually perihilar and present with recurrent pneumonia, cough, haemoptysis and, very occasionally, chest pain. Rarely, cushingoid or acromegalic features may occur and metastases occur in 15–50% of tumours dependent on its differentiation. They may be treated with lung lobectomy or where this is not feasible (such as in cases of multiple intraluminal bronchial polypoid tumours), they have been treated with laser/argon plasma coagulation. Survival of 92% at 10 yr has been reported.[6]

Anaesthetic considerations in patients with carcinoid syndrome include prevention of mediator release, avoiding triggering factors and preparation for the management of peri-operative carcinoid crisis. It is the respiratory and cardiovascular effects with which an anaesthesiologist should be familiar with because of their severity. Bronchoconstriction which may present as wheezing and paroxysmal coughing can be life-threatening and requires prophylactic treatment. Avoidance of triggering factors is another important consideration. These factors may be grouped as physiological (stress, anxiety, light plane of anaesthesia, hypercapnia, hypothermia, hypertension or hypotension), mechanical (tracheal intubation/extubation, tumour handling), or pharmacological (catecholamine and histamine releasing drugs). Therefore, general anaesthesia should be induced cautiously using slow, titrated dose of drugs that have minimal haemodynamic effect.[7]

As with the intra-operative management, post-operative care will focus on the provision of stable cardio-respiratory conditions and adequate analgesia. High-dependency care is recommended. Ongoing hormonal control of the tumour is important as postoperative crises are possible and surgery may have been aimed at reducing the bulk of carcinoid tumour present, rather than eliminating it. Intravenous and then subcutaneous octreotide follow-up will help control any further hormone release and there may well be residual, hormonally active tumour remaining. Forty-eight hours of invasive monitoring, analgesia and fluid management may be required to ensure safe recovery from the surgery.[6]

As our patient had normal haematological and biochemical profile with no evidence of carcinoid symdrome and minimal airway obstruction, our choice of anesthesia was general anaesthesia with intravenous induction and administering short acting muscle relaxant after confirming bag and mask ventilation, intubation was done under direct laryngoscopy with a right sided double lumen endotracheal tube of size 37 and and anaesthesia was maintined with inhalational agent in the form of halothane and vecuronium for skeletal muscle relaxation and managed successfully perioperatively.

CONCLUSION: The anesthetic management of patients with mediastinal tumors is associated with risks and challenges, including potential airway compression and cardiovascular collapse. Induction of general anesthesia tends to exacerbate side effects related to airway and cardiovascular invasion, even though it is not an absolute contraindication. A careful preoperative evaluation of signs and symptoms, of chest X ray, CT scan, MRI, cardiac echogram and venous angiogram should be helpful to investigate the area of invasion to prevent cardiorespiratory problems before submitting the patient to general anesthesia and decide on the treatment protocol for symptomatic and asymptomatic patients. In the case of carcinoid tumours the potential for intra-operative release of vasoactive compounds must not be underestimated even in patients who are currently asymptomatic and Anaesthesiologist should preplan responses to variations in blood pressure and heart rate and be in a position to recognize the cause of any change.

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