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Case Report

Anesthetic management in a challenging case of primary pulmonary synovial sarcoma

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ABSTRACT

Primary pulmonary synovial sarcoma is a very rare tumor. This tumor accounts for less than 0.5% of all lung neoplasia. While synovial sarcomas are commonly reported from periarticular tissues, they are often found in lung or thorax as a metastasis from an extrapulmonary primary. However, rarely they arise primarily from lung tissue. We report a case of primary pulmonary synovial sarcoma which was indenting the right side of the heart. He was managed with neoadjuvant chemotherapy followed by surgical resection. The anesthetic management was challenging. The focus was kept on stringent invasive as well as non-invasive monitoring of cardiac and respiratory parameters. The surgery was uneventful and the patient made a successful recovery.

Keywords: Anesthetic management, Primary pulmonary synovial sarcoma, Lung neoplasia

INTRODUCTION

Primary pulmonary synovial sarcoma (PPSS) is a very rare tumor. This tumor accounts for less than 0.5% of all lung neoplasia.[1] While synovial sarcomas are commonly reported from periarticular tissues, they are often found in lung or thorax as a metastasis from an extrapulmonary primary.[2] However, rarely they arise primarily from lung tissue. This tumor often grows into a very large size. The primary management of these tumors is surgical excision often combined with neoadjuvant chemotherapy.[3] The presence of a large sized mass lesion within the thorax creates challenges for the anesthetist.[4] We report a case of a patient who had a giant PPSS which was affecting his cardiac function. The anesthetic management of this case is discussed in detail.

CASE REPORT

A 19 years old young male presented to our hospital for evaluation of mass lesion in his chest. He was apparently well 6 months back when he began to develop cough. The cough was dry, intermittent and increased on lying down. He had been given symptomatic treatment by his family physician but the cough did not improve. He reported some undocumented weight loss but did not have any fever, night sweats, hemoptysis or reduction in appetite. About 4 months ago, he also began to experience dyspnea on exertion. Earlier this symptom was present only on running but for last 2 months he was feeling dyspneic on performing a brisk walk. A chest radiograph ordered by his family physician showed a large mass in his right lung. He was misdiagnosed as pulmonary tuberculosis and antitubercular drugs were started for a couple of months. When he did not find any relief in his symptoms, he presented to us. Upon examination his vitals were stable. He was 186 cm tall with a current weight of 69 kg. His general physical examination was otherwise unremarkable. He had good mouth opening with normal neck movements. His Mallampati score was 2. Despite his reported dyspnea his MET score was more than 4. Systemic examination

showed reduced air entry in right mid and lower lobes with dullness on percussion in the same areas. For his further work up a contrast enhanced tomography of chest was ordered. The CT chest showed a large heterogenous mixed density lesion in the right lung cavity. The lesion had cystic and solid components with internal septations. It was abutting and probably involving the right chest wall while medially it was causing a mediastinal shift to the left side. The tumor appeared to indent the right side of the heart as well (Figure 1).

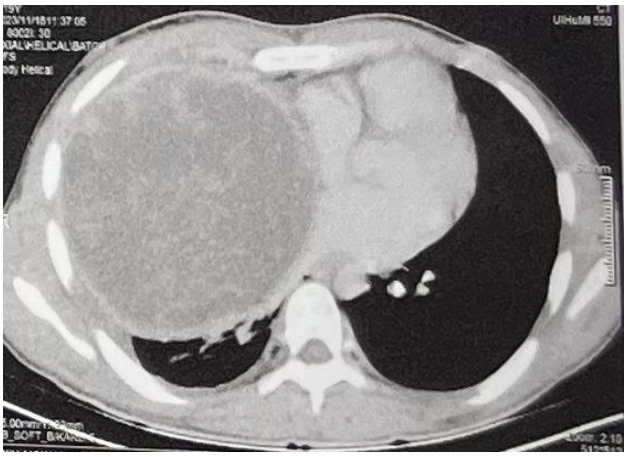

Figure 1: CT image showing the lung mass indenting the heart.

The collapsed lung was noted below the lesion. The lesion showed poor enhancement post contrast. There were a few sub centimetric mediastinal lymph nodes. A two-dimensional echocardiography showed that there was external compression of the right atrium which extended upto the tricuspid valve annulus.

A CT guided tru-cut biopsy of this lesion was performed through the right chest wall. The biopsy report was consistent with synovial sarcoma (spindle cell type). A 18 fluorodeoxyglucose (FDG) PET-CT was performed to assess any distant metastasis. The FDG-PET-CT revealed increased uptake in the right lung mass with some uptake in mediastinal lymph nodes. The treatment plan of this patient was formulated accordingly. He was planned for neo-adjuvant chemotherapy followed by surgical resection. He received 8 sessions of ifosfamide and adriamycin based chemotherapy. A careful monitoring of cardiac function was performed to detect any adriamycin induced worsening. After completion of the chemotherapy, he was posted for diagnostic thoracoscopy followed by en bloc resection of the tumor. The possibility of rib resection and repair was also kept based upon the radiological images.

Anesthetic management

The anesthetic management of this case focused on the existing cardio-respiratory compromise and the possibility of its worsening during the surgery. While a combination of general anesthesia with thoracic epidural anesthesia was planned, the focus was kept on stringent invasive as well as non-invasive monitoring of cardiac and respiratory parameters. The patient was brought to the operation theatre and all standard ASA monitoring was initiated. A central venous access was established prior to induction of anesthesia. The patient was preoxygenated with oxygen 6 l/min with a facial mask. Anesthesia was induced using propofol (80 mg), fentanyl (150 ug). Rocuronium 50 mg was given for neuromuscular blockade. Then we performed direct laryngoscopy followed by insertion of left sided Mallinckrodt DLT (size 41F).

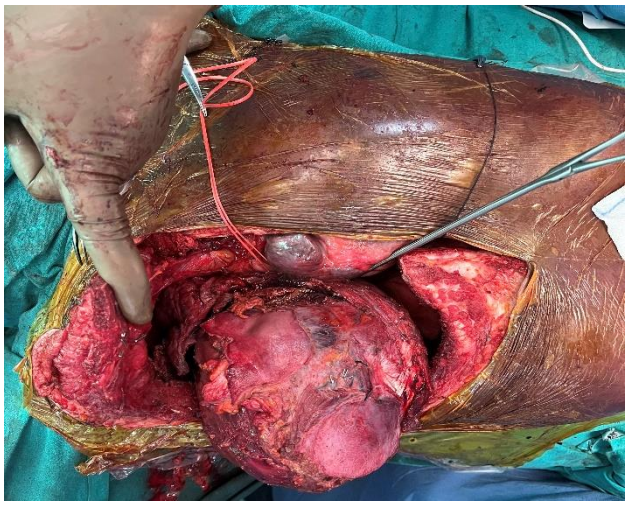

Figure 2: Intraoperative image showing the partially resected tumor.

The correct placement of tube was confirmed by fiberoptic bronchoscopy as well as by capnography and auscultation. After induction, arterial line was inserted and transducer was attached to provide beat to beat monitoring of blood pressure. Similarly, the central venous line was connected to the relevant transducers for monitoring of central venous pressures. Epidural catheter was inserted at thoracic level (T7-8) via midline approach (using 18G Tuohy's needle) to provide intraoperative and post operative pain relief to the patient. The induction of anesthesia progressed smoothly and the patient remained hemodynamic stable. He was initiated on volume-controlled mechanical ventilation with low tidal volume strategy during one-lung ventilation. The maintenance of anesthesia was achieved by using propofol infusion along with dexmedetomidine infusion to maintain a BIS ranging 40-60. A noradrenaline infusion was kept ready in the anticipation of sudden hypotension which may occur in case of cardiac compression during tumor mobilization. The blood pressure was closely monitored. The surgery proceeded uneventfully and the tumor was excised successfully. Due to invasion of the right 5^{th} and 6^{th} ribs, partial rib resection had to be performed. A large solid cystic mass of size 14 cm by 15 cm by 16 cm along with the partial 5^{th} and 6^{th} right ribs was removed (Figure

2). Intercostal drainage tube insertion was also done at the right side.

The surgery lasted for a total duration of 10 hours. The blood loss in the surgery was 2200 ml; three units of packed red blood cell concentrate (PRBC) and four units of fresh frozen plasma were transfused. The arterial blood gas samples drawn during the surgery and immediate post operatively showed normal parameters. The patient was shifted to the intensive care unit in an intubated state with a plan for elective mechanical ventilation till the next morning. The hemodynamic parameters were closely monitored in the interim. Analgesia was maintained by epidural fentanyl infusion. He was successfully extubated the next morning and was able to maintain oxygen saturation and had normal arterial blood gas parameters on supplemental oxygen at 6 l/min via face mask.

DISCUSSION

Primary pulmonary synovial sarcomas are rare tumors of the thorax. These tumors however can increase in size to a great extent.[5] They can generate compression in the heart, great vessels and airway. They can even present with the collapse of the airway when placed in a supine position, which is known as mediastinal mass syndrome (MMS). Risk factors for MMS are pericardial effusion, tracheal compression of >50%, and mixed restrictive and obstructive patterns on pulmonary function tests.[6] The hemodynamic and ventilatory changes occurring during general anesthesia secondary to the compression of intrathoracic structure makes the surgery for resection of mediastinal tumors a great challenge. The anesthetic considerations during surgery for such patients vary according to the findings and the proposed surgery. In most of these thoracic approaches, one-lung ventilation (OLV) is necessary.[7] The use of OLV presents its own challenge and requires some experience in the technique and management of complications. Double lumen tubes (DLTs) are large and unwieldy- their positioning is are often difficult. The addition of a difficult airway, known or unexpected makes the situation even worse. A careful airway evaluation in the preanesthetic assessment is vital.

Securing the airway by successful intubation is usually the first priority and the first challenge. Prior experience with use of DLTs is often necessary and it is advisable that such a person be included in the anesthesia team. The choice of an appropriately sized double lumen tube (DLT) and ensuring its proper placement is critical for adequate lung isolation. An undersized DLT increases the risk of increased positive end-expiratory pressure (PEEP) and dynamic lung hyperinflation. The correct DLT size is the largest size DLT which will atraumatically traverse the glottis and trachea and the bronchial component of which sits in the mainstem bronchus with only a small air leak.[8] Due to the technically challenging nature of the procedure, blindly placed DLTs can be mispositioned in upto 50% of cases. Therefore, fiberoptic bronchoscopy is recommended for confirming placement.

In surgery for thoracic masses, the pharmacological choice to maintain general anaesthesia is usually total intravenous anesthesia (TIVA). Inhaled anesthetics inhibit hypoxic pulmonary vasoconstriction but they do have the advantage of attenuating the inflammatory response, protecting the glycocalyx and lung parenchyma. TIVA techniques do not alter hypoxic pulmonary vasoconstriction and can reduce ventilation and perfusion (V/Q) imbalance and improve oxygenation. Therefore in OLV, TIVA is the preferred modality.[8] During OLV, the surgically operated lung is excluded from ventilation, while perfusion is maintained. This mismatch between ventilation and perfusion (V/Q) creates an intrapulmonary shunt with hypoxemia. Additionally, loss of alveolar recruitment of the unoperated lung due to general anesthesia can further impair oxygenation. The application of PEEP to the unoperated lung must be individualized.[9] As PEEP approaches the inflection point of the patient's static lung compliance curve, oxygenation is likely to improve but, if the end-expiratory equilibrium pressure increases beyond the inflection point, oxygenation may worsen.

Lung masses which impinge on the cardiac structures create a unique risk. Intraoperatively the reduced cardiac reserve may cause sudden drop in blood pressure when the sympathetic vascular tone is affected by anesthesia. Such sudden hypotension can sometimes be lethal.[10] Therefore, careful monitoring of BP is essential. Further, tumor handling during excision can sometimes worsen the cardiac compression- therefore monitoring must be carefully done till the end of surgery. Pain management strategies are an important part of anesthetic management, especially where extensive surgical resection is planned. Adequate pain control is essential while preservation of respiratory drive and hemodynamic stability is vital.[11] Multimodal anesthesia aims to provide adequate postoperative analgesia while reducing postoperative complications. Postoperative pain in thoracic surgery coincides with each respiratory cycle, causing patients to have constant pain. Apart from the usual intravenous analgesics, regional anesthesia is of critical importance in these surgical procedures. Thoracic epidural analgesia has shown to be excellent is this regard. Epidural analgesia especially at usual doses, does not significantly affect oxygenation and can even prevent the development of acute lung injury. It also avoids hemodynamic compromise. Alternative regional anesthesia techniques such as serratus anterior block, paravertebral block and erector spinae block may supplement epidural analgesia.[12]

CONCLUSION

PPSS are rare cancers which often require thoracic surgery. Due to the large size of these tumors and the resultant mediastinal compression, anesthesia can be challenging. A carefully formulated anesthetic plan which accounts for existing cardio-respiratory compromise and which anticipates intraoperative

worsening is critical in these cases. The use of one lung ventilation is mandatory and hence experience with the use of double lumen tubes is necessary. Appropriately designed TIVA approach is important. The anesthetic plan must keep in mind that a high degree of post-operative pain will occur and provisions for the same must be taken to prevent post-operative complications. A vigilant and proactive anesthetic team is critical in improving surgical outcomes of this rare disease.

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