

Anaesthetic Considerations in the Video-assisted Thoracoscopic Excision of Pulmonary Aspergilloma: A Case Report

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ABSTRACT

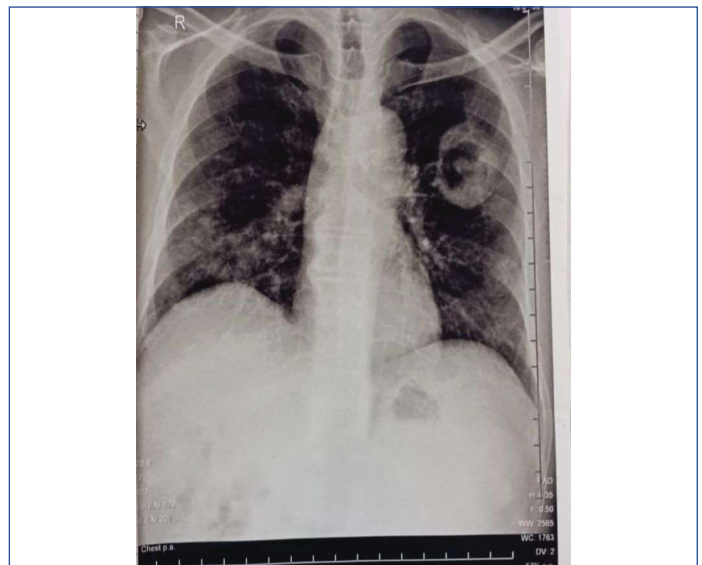
Video-assisted Thoracoscopy (VATS) is often used for diverse chest and lung ailments, which requires one-lung ventilation utilising a double-lumen tube. It involves small incisions and real-time imaging, resulting in enhanced postoperative recovery. A dry field allows the surgeon better visualisation of the thoracic cavity. To ensure that the patient is fit for prolonged single-lung ventilation, preoperative assessment is vital. While there are advantages and disadvantages to minimally invasive procedures, anaesthesia management and single-lung ventilation are key steps in a successful VATS procedure. Care must be taken to avoid elevated peak pressures intraoperatively. Hereby, the authors present a case report of a 49-year-old smoker with cough, fever, a known treated case of pulmonary Koch's, and chronic lung disease. After a thorough clinical examination and imaging, he was diagnosed to have a cavitary lesion in the lung, suggestive of Aspergilloma. Authors performed thorough preoperative evaluation prior to surgery, which included pulmonary function tests to help identify the performance of the residual lung. For this patient, VATS was employed to resect the cavitary lesion along with the fungal ball. Single-lung ventilation with a double-lumen endotracheal tube was utilised to collapse the right lung and provide a better operative field. The surgery was uneventful with minimal blood loss, and histopathology confirmed the diagnosis. Due to the minimal access route, the duration of ventilation and recovery is hastened. Appropriate antibiotic/antifungal support, along with aggressive chest physiotherapy and incentive spirometry, is initiated early in such patients, as the pain following VATS is bearable.

Keywords: Cavity, Single-lung ventilation, Thoracic, Tuberculosis

CASE REPORT

A 49-year-old male patient with a history of respiratory issues sought care at the Cardiology Outpatient Department. His primary complaint was a persistent cough for three months with breathlessness, modified Medical Research Council (mMRC) scale grade 1, and a history of Aspergillosis and drug-resistant tuberculosis, for which he was previously treated with antitubercular medicines two years ago.

Preoperative pulmonary function tests were normal, and then the patient was considered for video-assisted thoracoscopic surgery. Left pulmonary artery embolisation was performed to reduce bleeding during surgery. He was a known case of chronic liver disease with jaundice and hepatic encephalopathy for two years; he had been on diuretic therapy for the same duration. He had been taking anti-diabetic medications for two decades, such as dapagliflozin (10 mg once a day), sitagliptin (50 mg twice a day), and voglibose (0.2 mg twice a day). Two years prior to this presentation, he had a history of resistant pulmonary tuberculosis (300/600 mg). Additionally, he had a long-standing history of alcohol consumption for over seven years. On examination, his heart rate was 72 beats per minute, blood pressure was 110/70 mmHg, and oxygen saturation was 98% in room air. The Electrocardiogram (ECG) revealed normal sinus rhythm, while 2-dimensional (2D) echocardiography showed an ejection fraction of 60%, Pulmonary Artery Hypertension (PAH), moderate mitral regurgitation, and moderate tricuspid regurgitation. A chest X-ray indicated a cavitary lesion in the left lobe with calcified margins and patchy ground-glass opacities [Table/Fig-1]. High-resolution Computed Tomography (HRCT) revealed a lesion measuring 4.6×3.7 cm in the superior segment of the left lower lobe, with a solid component within the cavity measuring 2×2.7 cm, suggestive of aspergilloma. Atherosclerotic calcifications were observed in the aortic arch and its branches. Lymph nodes, several centimeters and sub-centimeters in size, were noted in various regions.

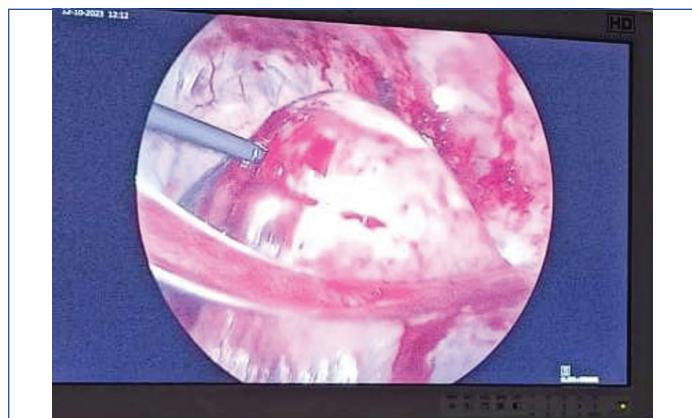
**[Table/Fig-1]:** Preoperative chest X-ray.

During the preanaesthetic checkout, the patient was alert and oriented, with good oral health and a Mallampati grade of 1. Intraoperatively, routine American Society of Anaesthesiologists (ASA) monitors were attached, and intravenous (i.v) fluids were started after establishing secure peripheral intravenous access. An 18-gauge epidural needle was inserted at the T5-T6 intervertebral space using the Loss of Resistance (LOR) method, and an epidural catheter was placed and secured. A bolus dose of 0.25% Bupivacaine with 3 milligrams of Morphine was administered. A 7 Fr triple-lumen central venous catheter was placed via the right internal jugular vein using the landmark technique and properly secured.

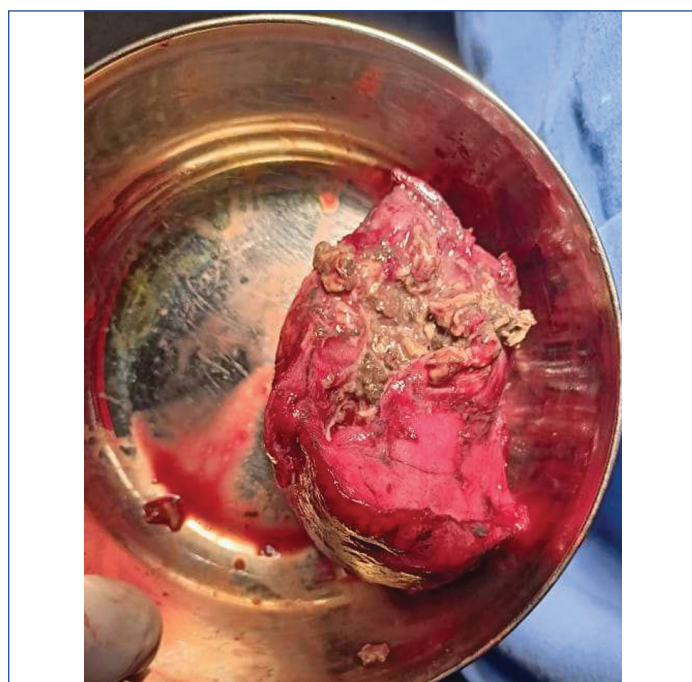
The patient was pre-oxygenated for three minutes with 100% oxygen. Premedication was initiated with Midazolam at a dose of 0.02 mg per kilogram of body weight and Fentanyl at a dose of

2 micrograms per kilogram of body weight. The patient was induced with Propofol at a dose of 2 milligrams per kilogram of body weight, and muscle relaxation was achieved by injecting Vecuronium at a dose of 0.1 milligrams per kilogram. A left double-lumen tube with a size of 37 French was placed and secured at a depth of 26 centimeters, confirmed by auscultation and flexible bronchoscopy.

Throughout the surgery, any drop in blood pressure was managed using 50 to 100 micrograms of injection Phenylephrine. Invasive pressure monitoring was established by cannulating the right radial artery. The peak and plateau airway pressures remained at 30 and 30 cm H₂O, respectively. The patient was positioned in a right lateral decubitus position, and a camera port was inserted to remove the pathological mass [Table/Fig-2-5], achieving haemostasis. An infusion of injection Bupivacaine at a concentration of 0.25% was ongoing at a rate of 0.1 mL/kg per hour. Vasopressors were not required once the cavity was sealed.

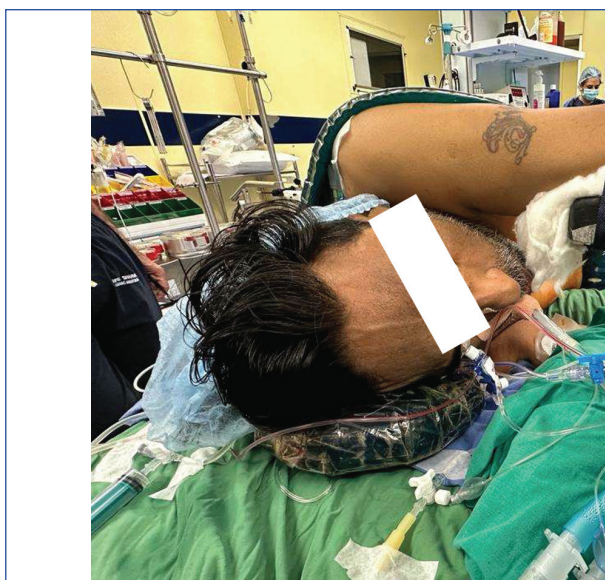


[Table/Fig-2]: Intraoperative image of dissection of the pleura from the lobe.

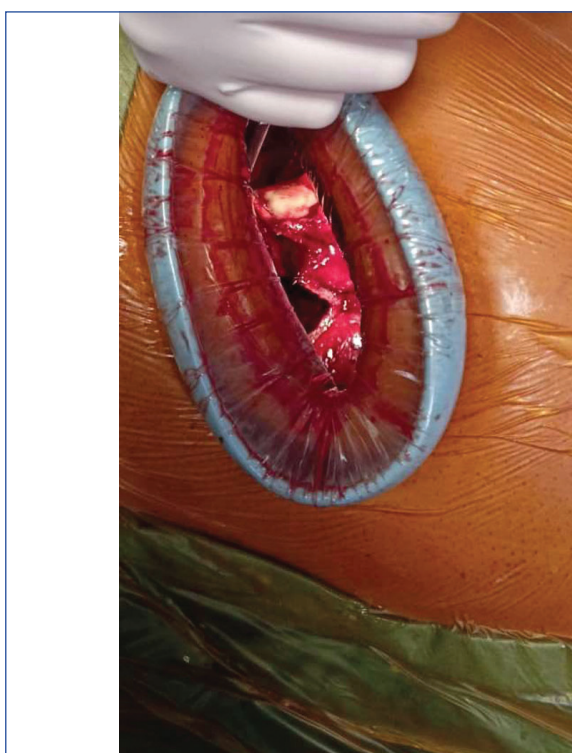


[Table/Fig-3]: Image of excised lobe.

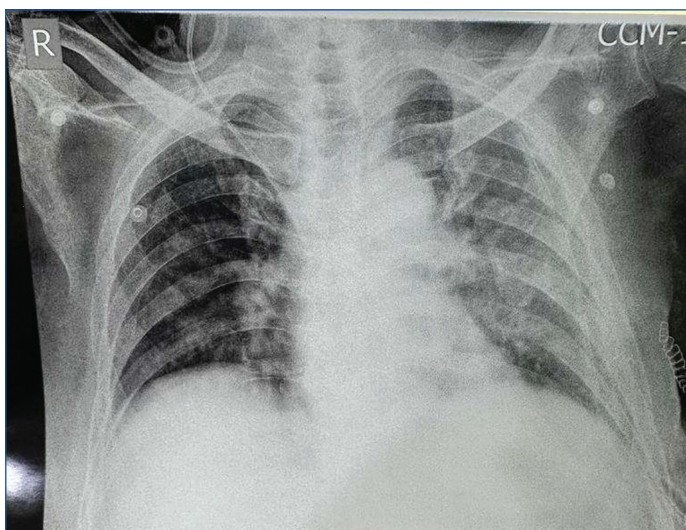
Postoperative care: Upon completion of the surgery, intratubal suctioning was performed, and the patient was carefully repositioned after adequate weaning. Respiratory muscle relaxation was reversed using intravenous Neostigmine and Glycopyrrolate (2.5 mg+0.4 mg), and the patient was extubated in the operating room. Arterial blood gas analysis was performed and found to be normal. To aid the patient's postoperative pain management and facilitate breathing, continuous epidural 0.25% Bupivacaine infusion was maintained at 0.05-0.1 mL/kg per hour. The patient was subsequently transferred to the Intensive Care Unit (ICU) for close postoperative monitoring and care [Table/Fig-6].



[Table/Fig-4]: Patient positioning during surgery.



[Table/Fig-5]: Wound protector utilised with a small incision to prevent spread of infection.



[Table/Fig-6]: Postoperative X-ray revealing the expansion of remaining lung parenchyma with no effusion.

DISCUSSION

Managing patients with aspergilloma in drug-resistant tuberculosis who require surgical intervention can be complex due to the presence of pulmonary adhesions and altered lung anatomy. This is associated with high morbidity and mortality rates that might reach 43%. Moreover, surgery carries a significant risk of complications, such as massive blood loss, bronchopleural fistula, post-resection pleural cavity problems, empyema, and death from respiratory failure [1-6]. There are also several reports of long-term better outcomes and survival after surgery to a greater extent than with medical therapy alone in patients who are experiencing symptoms. According to the most recent reports, the fatality rates are less than 6%, whereas the morbidity rates range from 20% to 40% [4-7]. Although surgery for aspergilloma is considered risky, a recent study conducted in our country by Mohapatra B et al., concluded that surgical excision can be performed with acceptable morbidity and mortality rates to provide the patient with a complete cure and symptom-free survival. This finding is similar to the conclusion reached by Pratap H et al., who also conducted their research in India [8,9].

Therefore, it is necessary to carefully consider the total risk-benefit ratio and select cases in accordance with this ratio to achieve consistently improved outcomes. Babatasi G et al., concluded that pulmonary resection was the best alternative whenever the diagnosis of aspergilloma has been confirmed and the patient is a suitable candidate for the operation [10]. This conclusion was based on a 39-year series of 80 cases. In patients experiencing symptoms, the question of whether surgical treatment is appropriate is less contentious. However, in present case, surgery via VATS was deemed the operating modality of choice.

However, this is not the case for patients who are asymptomatic, and a significant percentage of treating physicians will choose to manage asymptomatic SA using conservative methods. On the other hand, it is important to keep in mind that approximately 20% of patients diagnosed with aspergilloma develop invasive aspergillosis, which makes surgical procedures more challenging [10]. In present case,

VATS with one-lung ventilation using a double-lumen tube proved to be an effective approach for aspergilloma excision.

CONCLUSION(S)

The VATS with one-lung ventilation using a double-lumen tube is a valuable technique for patients with pulmonary tubercular lesions. A multi-modal anaesthetic approach, careful intraoperative management, and postoperative pain control are crucial elements for a successful surgical outcome in these cases. The present case report highlights the importance of a multidisciplinary approach in managing such complex patients. From present case report and the experience with the management, as well as a brief review of the literature, authors understood the advantages of performing VATS in such situations, the improved postoperative outcomes, and the reduced pain. Even for the Anaesthetist, it is essential to ensure adequate ventilation while maintaining optimal pressures.

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