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Case Report

Anesthesia Management in an Elderly Male with a Case of Adenocarcinoma Lung Posted for Right Lower Lobe Lobectomy: A Case Report

Shilpa Kore, Anushka Sharma*

Dr D Y Patil Medical College Hospital and Research Centre, Vidyapeeth, Pimpri, Pune, India.

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ABSTRACT

Lobectomy with one-lung ventilation presents significant anesthetic challenges, particularly in elderly patients with multiple comorbidities. This case report describes the successful anesthetic management of an elderly patient with adenocarcinoma lung undergoing right lower lobe lobectomy. An elderly male with adenocarcinoma of the right upper lobe presented for lobectomy. His complex medical history included chronic kidney disease requiring regular hemodialysis, post-stroke right-sided hemiparesis, hypertension, hypothyroidism, and diabetes mellitus. The anesthetic management involved careful preoperative optimization, use of a left-sided double-lumen tube for one-lung ventilation, and meticulous hemodynamic monitoring. Challenges encountered included a brief episode of hypoxemia during one-lung ventilation and hypertension, which were successfully managed with ventilator adjustments and dexmedetomidine infusion, respectively. The six-hour surgery was completed successfully with minimal blood loss. The patient was extubated postoperatively and maintained stable oxygenation on supplemental oxygen. Pain management was achieved through multimodal analgesia, including a fentanyl patch. This case illustrates that complex thoracic surgery can be safely conducted in high-risk patients through comprehensive preoperative evaluation, careful intraoperative management, and adherence to enhanced recovery protocols. The successful outcome emphasizes the importance of a multidisciplinary approach in managing such challenging cases.

Introduction

Lobectomy remains a standard surgical procedure for early-stage lung cancer, involving the removal of a diseased lobe of the lung to achieve optimal oncological outcomes [1]. The procedure presents significant anesthetic challenges, particularly in elderly patients with multiple comorbidities. One-lung ventilation (OLV) is typically required during thoracic procedures to facilitate surgical access and protect the contralateral lung [2]. However, managing OLV can be complex due to potential complications such as hypoxemia, which occurs in approximately 5-10% of cases due to ventilation-perfusion mismatch and intrapulmonary shunting [3].

The presence of comorbidities such as cardiovascular disease, diabetes mellitus, or chronic kidney disease further complicates anesthetic management during lobectomy. These conditions necessitate careful preoperative evaluation, meticulous intraoperative monitoring, and specific considerations for ventilation strategies [4]. The use of double-lumen tubes or bronchial

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*Corresponding author.
E-mail address: anushka.as.sharma.2898@gmail.com

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blockers for lung isolation requires expertise in placement and confirmation of position, as improper placement can compromise surgical exposure and patient safety [5].

In elderly patients, physiological changes associated with aging, combined with the effects of underlying malignancy and comorbidities, can affect perioperative outcomes. Enhanced Recovery After Thoracic Surgery (ERATS) protocols have emerged as evidence-based approaches to improve postoperative outcomes, reduce complications, and optimize recovery [6]. Here, we present the case of an elderly male with adenocarcinoma of the lung and multiple comorbidities, including chronic kidney disease, post-stroke residual paralysis, and hypertension, who underwent right lower lobe lobectomy under general anesthesia with one-lung ventilation.

Case Report

A 48-kg elderly male presented with a 26x4 cm swelling in the right posterior mid-thoracic region. The swelling was liftable and pinchable but did not move with respiration. Initial management involved wide local excision of the swelling, which upon histopathological examination revealed squamous cell carcinoma. Further investigation with PET CT demonstrated a 2.7x2.3 cm nodular lesion in the right upper lobe of the lung with mild pleural thickening, subsequently diagnosed as adenocarcinoma through biopsy (Figure 1).

Figure 1- CT showing nodular lesion in the right upper lobe of the lung with mild pleural thickening

The patient's medical history was significant for multiple comorbidities. He had been managing hypertension for 15 years with amlodipine 5mg twice daily and hypothyroidism for five years with thyroxine 50 mcg once daily. The patient had diabetes mellitus for five years but was not on medication. Additionally, he had been undergoing twice-weekly hemodialysis for chronic kidney disease for seven years, managed with sodium bicarbonate 500mg thrice daily and prazosin 5mg twice daily. A cerebrovascular accident seven years prior had resulted in right-sided hemiparesis, with current power grades of 2/5 in the right upper limb and 4/5 in the right lower limb. The patient had previously undergone left percutaneous nephrolithotomy under spinal anesthesia 15 years ago and had recovered from COVID-19 in 2021 with conservative management. Physical examination revealed decreased air entry on the right side, and the patient tested positive for HBsAg. Preoperative investigations yielded notable findings. Routine blood parameters were within normal limits. Two-dimensional echocardiography showed mild concentric left ventricular hypertrophy with an ejection fraction of 50%. Chest radiography revealed round consolidation in the right upper zone (Figure 2). While the patient could not perform spirometry, a six-minute walk test showed no significant desaturation. Given the complex medical history, the patient was evaluated by multiple specialists, including respiratory medicine, cardiology, medical gastroenterology, nephrology, and neurology, who collectively deemed him high-risk for surgery.

Figure 2- Chest X-ray showing round consolidation in the right upper zone

Preoperative preparation included obtaining arterial blood gas analysis from the right femoral artery and securing high-risk, surgical intensive care unit, and ventilator consent. Blood and blood products were arranged in advance. The patient was instructed to maintain nil by mouth status for more than six hours before surgery while continuing thyronorm 50 mcg and amlodipine 5 mg on the morning of surgery. This case presented multiple anesthetic challenges, including the need for one-lung ventilation in a patient with decreased

respiratory reserve, management of multiple comorbidities, and the potential for postoperative complications. The presence of residual hemiparesis and chronic kidney disease requiring regular dialysis further complicated the perioperative management plan. The thorough preoperative evaluation and multidisciplinary approach were crucial in optimizing the patient for surgery (Figure 3).

Figure 3- Right Lower Lobe Lobectomy specimen

Discussion

The successful management of this complex case highlights several important considerations in thoracic anesthesia, particularly regarding one-lung ventilation (OLV), perioperative management of multiple comorbidities, and enhanced recovery protocols in high-risk patients undergoing lobectomy.

The implementation of OLV in our case presented significant challenges, primarily due to the patient's compromised respiratory status and multiple comorbidities. As demonstrated by Karzai and Schwarzkopf [2], the transition from two-lung to one-lung ventilation typically results in an increased shunt fraction, which can reach up to 50%. In our patient, we observed a brief episode of hypoxemia (SpO2 92%) immediately following OLV initiation, consistent with findings from similar cases in the literature. This hypoxemia was effectively managed by increasing FiO2 to 1.0 and optimizing PEEP, aligning with current recommendations for OLV management [1].

The positioning of thoracic surgery patients significantly impacts ventilation mechanics and hemodynamics. Chiumello et al. [3] demonstrated that lateral decubitus positioning during OLV affects lung elastance and may predispose patients to ventilator-associated lung injury. Our approach to ventilation strategy focused on preventing alveolar collapse while minimizing impairment of dependent lung perfusion, similar to protocols described in recent studies [5]. The successful management of our patient's oxygenation supports the effectiveness of this approach in high-risk cases. The presence of chronic kidney disease requiring regular hemodialysis added another layer of complexity to our case. Previous studies have shown that patients with end-stage renal disease undergoing thoracic surgery have higher risks of perioperative complications [4]. Our decision to perform the surgery the day after dialysis, along with careful fluid management guided by central venous pressure monitoring, proved effective in maintaining hemodynamic stability throughout the procedure.

The patient's history of cerebrovascular accident with residual hemiparesis necessitated special consideration in airway management and positioning. While literature on the anesthetic management of post-stroke patients undergoing thoracic surgery is limited, our experience suggests that careful positioning and monitoring of neuromuscular blockade are crucial. The successful use of dexmedetomidine for hemodynamic control in our case aligns with recent studies showing its efficacy in providing stable intraoperative conditions during thoracic surgery [6]. Following Enhanced Recovery After Thoracic Surgery (ERATS) principles was particularly important in our high-risk patient. Batchelor et al. [6] have shown that implementation of ERATS protocols can significantly improve postoperative outcomes. Our approach incorporated several key ERATS elements, including optimization of preoperative status, careful fluid management, and early extubation when appropriate. The successful extubation and immediate postoperative course in our patient support the applicability of ERATS principles even in complex cases.

Pain management is crucial in thoracic surgery, as inadequate analgesia can lead to respiratory complications and delayed recovery. The use of multimodal analgesia, including a fentanyl patch in our case, aligns with current recommendations for post-thoracotomy pain management [6]. Ochroch et al. [7] have demonstrated that effective pain control is essential for preventing chronic post-thoracotomy pain syndrome and improving long-term outcomes.

The successful outcome in our case underscores the importance of comprehensive preoperative evaluation and optimization in high-risk patients. The multidisciplinary approach involving various specialists contributed significantly to the positive outcome, supporting findings by Mazzone [4] regarding the importance of thorough preoperative assessment in lung resection candidates.

Conclusion

This case demonstrates that successful anesthetic management of a high-risk elderly patient with multiple

comorbidities undergoing lobectomy is achievable through meticulous preoperative evaluation, careful intraoperative monitoring, and adherence to enhanced recovery protocols. The challenges of managing one-lung ventilation in a patient with compromised respiratory function, chronic kidney disease, and post-stroke residual paralysis were effectively addressed through a combination of appropriate ventilation strategies, hemodynamic optimization, and careful drug selection. The case highlights the importance of a multidisciplinary approach in preoperative assessment and the value of following established protocols while remaining flexible enough to adapt to individual patient needs. The successful outcome underscores the significance of thorough preparation, vigilant monitoring, and prompt management of complications in high-risk thoracic surgery cases.

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