

CASE REPORT

A Case of Thoracotomy with One-Lung Ventilation for Carcinoma Esophagus: Anaesthetic Management

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ABSTRACT

Introduction: Carcinoma esophagus remains a major global cause of morbidity and mortality. Surgical resection, performed through transthoracic esophagectomy (TTE) or minimally invasive esophagectomy (MIE), is the primary treatment for localized disease. These surgeries require lung isolation to ensure optimal exposure, reduce contamination of the opposite lung, and limit operative lung injury. One-lung ventilation (OLV) markedly alters respiratory physiology by creating a right-to-left intrapulmonary shunt, leading to hypoxemia and increased pulmonary vascular resistance. These effects demand careful anesthetic planning and enhanced intraoperative monitoring to maintain patient safety and optimize outcomes.

Case Report: A 58-year-old female (ASA II, ECOG 1), known case of moderately differentiated squamous cell carcinoma of the middle-third of the esophagus, post-neoadjuvant chemoradiotherapy (Paclitaxel + Carboplatin, 41–40 Gy in 23 fractions), was posted for VATS-assisted transthoracic esophagectomy. Preoperative evaluation revealed BMI 21 kg/m², Hb 11.2 g/dL, normal renal and hepatic profile, ECG with sinus rhythm, 2D echo with preserved LV systolic function (LVEF 60%), mild mitral valve prolapse, PASP 35 mmHg. Chest x-ray was normal.

Thoracic epidural catheter was inserted at T8–T9 (loss-of-resistance technique, 18G Tuohy needle) and test dose (Lidocaine 2% + adrenaline 3 mL) was negative. Balanced general anaesthesia was induced with IV glycopyrrolate 0.2 mg, fentanyl 60 µg, lignocaine 40 mg, propofol 80 mg, and vecuronium 3 mg. The airway was secured with a 28 Fr left-sided double-lumen endotracheal tube (DLT) under direct laryngoscopy (Cormack–Lehane Grade 1 view), tube position confirmed by auscultation and fiberoptic bronchoscopy.

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Intraoperatively, the patient was placed in left lateral decubitus position and maintained on OLV with volume-controlled ventilation (tidal volume 5–6 mL/kg predicted body weight, FiO_2 0.6, PEEP 5 cmH_2O). Hemodynamics remained stable (HR 80–85/min, MAP 75–85 mmHg, $\text{SpO}_2 > 95\%$). ABG analysis intraoperatively showed mild respiratory alkalosis (pH 7.47) without hypercarbia. Estimated blood loss was 450 mL; replacement included crystalloids, and one unit packed red cells.

At the conclusion of surgery, after repositioning supine, the DLT was electively exchanged for a single-lumen cuffed Portex ETT (size 7.0 mm) using an airway exchange catheter. Patient was extubated and shifted to ICU. Analgesia was maintained with PCEA (0.125% bupivacaine intermittent boluses), facilitating early mobilization and incentive spirometry. Postoperative course was uneventful, and the epidural catheter was removed on postoperative day 5.

Conclusion: Anaesthetic management of esophagectomy with OLV requires comprehensive preoperative optimization, advanced airway management, lung-protective ventilation, vigilant hemodynamic monitoring, and multimodal analgesia. Elective postoperative ventilation with controlled weaning and early mobilization contribute to favourable outcomes in high-risk thoracic surgery patients.

KEYWORDS

- One-Lung Ventilation • Transthoracic Esophagectomy • Double-Lumen Tube
- Perioperative Analgesia • Lung-Protective Ventilation • Thoracic Anaesthesia

INTRODUCTION

Carcinoma esophagus remains a major cause of morbidity and mortality worldwide. Surgical resection by transthoracic esophagectomy (TTE) or minimally invasive esophagectomy (MIE) is the definitive treatment for localized disease¹. These procedures necessitate lung isolation to provide adequate surgical exposure, minimize contamination of the contralateral lung, and reduce intraoperative lung trauma². One-lung ventilation (OLV) significantly alters respiratory physiology by creating a right-to-left intrapulmonary shunt, causing hypoxemia and increased pulmonary vascular resistance³, necessitating meticulous anaesthetic planning and advanced monitoring.

Case Report A 58-year-old female (ASA II, ECOG 1), known case of moderately differentiated squamous cell carcinoma of the middle-third of the esophagus, post-neoadjuvant chemoradiotherapy (Paclitaxel + Carboplatin, 41–40 Gy in 23 fractions), was posted for VATS-assisted transthoracic esophagectomy. Preoperative evaluation revealed BMI 21 kg/m^2 , Hb 11.2 g/dL, normal renal and hepatic profile, ECG with sinus rhythm, 2D echo with preserved LV systolic function (LVEF 60%), mild mitral valve prolapse, PASP 35 mmHg. Chest X-ray was normal.

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At the conclusion of surgery, after repositioning supine, the DLT was electively exchanged for a single-lumen cuffed Portex ETT (size 7.0 mm) using an airway exchange catheter. Patient was extubated and shifted to ICU. Analgesia was maintained with

PCEA (0.125% bupivacaine intermittent boluses), facilitating early mobilization and incentive spirometry. Postoperative course was uneventful, and the epidural catheter was removed on postoperative day 5.

DISCUSSION

lung isolation using a DLT is considered the gold standard for procedures requiring OLV. OLV produces major physiological changes including decreased FRC, increased shunt fraction (up to 20–30%), and risk of hypoxemia.^{3,5} Lung-protective strategies with low tidal volumes, moderate PEEP, and recruitment maneuvers reduce ventilator-induced lung injury.⁸

Perioperative epidural analgesia improves postoperative pulmonary function, reduces opioid consumption, improves rehabilitation, and facilitates early ambulation.⁷ Elective exchange of DLT to a single-lumen ETT after surgery is a commonly recommended practice to prevent airway trauma and allow more secure postoperative ventilation.⁶

CONCLUSION

Anaesthetic management of esophagectomy with OLV requires comprehensive preoperative optimization, advanced airway management, lung-protective ventilation,

vigilant hemodynamic monitoring, and multimodal analgesia. Elective postoperative ventilation with controlled weaning and early mobilization contribute to favourable outcomes in high-risk thoracic surgery patients.

Conflict of Interest: NIL

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