



Rescue One-Lung Ventilation via Orotracheal Double-Lumen Tube after Failed Fogarty Bronchial Blockade in Long-Term Tracheostomy Patients Undergoing Thoracic Surgery in a Resource-Limited Setting: A Case Series

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ABSTRACT

One-lung ventilation (OLV) is a prerequisite for adequate surgical exposure during video-assisted thoracic surgery (VATS) and open thoracotomy. Standard OLV techniques include double-lumen tube (DLT) intubation and endobronchial blockade with dedicated bronchial blockers. In patients with pre-existing tracheostomy, both approaches are technically challenging, and the difficulty is compounded in resource-limited settings where specialized bronchial blocking devices may be unavailable, necessitating improvised solutions. We describe two young adult male patients with long-term tracheostomy (>7 days) who underwent thoracic surgery: one VATS repair of a bronchopleural fistula and one thoracotomy for lung abscess evacuation. In both cases, lung isolation was first attempted using a 5 Fr Fogarty catheter as a surrogate bronchial blocker; this failed in each instance due to a size mismatch between the Fogarty cuff and the bronchial lumen. A rescue strategy was then applied: following general anesthesia induction, the tracheostomy cannula was removed, orotracheal intubation was performed with a left-sided 37 Fr DLT, and the stoma was temporarily sutured and dressed to prevent ventilation leaks. DLT position was confirmed by fiberoptic bronchoscopy in both cases. Effective OLV was achieved throughout each procedure. At closure, the DLT guided tracheostomy recannulation under direct visualization. Both patients were transferred post-operatively without airway complications. In resource-limited settings where dedicated bronchial blockers are unavailable, temporary decannulation with orotracheal DLT insertion and stomal occlusion represents a feasible rescue strategy for OLV in patients with long-term tracheostomy. This approach requires meticulous preoperative planning, fiberoptic bronchoscopy capability, and careful post-procedural stomal management.

The authors declare no conflicts of interest.

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Introduction

One-lung ventilation (OLV) is a prerequisite for adequate surgical exposure during video-assisted thoracic surgery (VATS) and open thoracotomy. Standard OLV techniques include double-lumen tube (DLT) intubation and endobronchial blockade with dedicated bronchial blockers [1-2]. In patients with pre-existing tracheostomy, both approaches become technically demanding: DLT placement requires navigation through a stoma of variable diameter and maturity, while bronchial blocker positioning must account for altered tracheobronchial geometry and the constraints imposed by the tracheostomy cannula [3-4]. The challenge is compounded in resource-limited settings where specialized bronchial blocking devices may be unavailable, necessitating improvised solutions. We report two cases in which a stepwise rescue strategy—temporary decannulation, orotracheal DLT insertion, and temporary stomal occlusion—successfully achieved OLV in patients with long-term tracheostomy.

Case Report

Case 1

A 20-year-old male (ASA III) with diffuse axonal injury (GCS E3V5M—) and right pneumothorax was scheduled for VATS repair of a bronchopleural fistula. Tracheostomy had been placed 24 days prior for airway protection in the setting of impaired consciousness. Following standard monitoring and general anesthesia induction with fentanyl, propofol, and rocuronium (sevoflurane 2 vol% maintenance), a 5 Fr Fogarty catheter was advanced through the tracheostomy cannula as a surrogate bronchial blocker; the cuff failed to occlude the bronchial lumen due to size mismatch. The tracheostomy tube was therefore removed, and a left-sided 37 Fr DLT was inserted via orotracheal intubation. Correct positioning was confirmed by fiberoptic bronchoscopy. The tracheostomy stoma was temporarily closed with primary sutures and sterile dressing. Pressure-controlled ventilation maintained SpO₂ and EtCO₂ within target ranges; clamping the tracheal DLT lumen achieved effective OLV with no detected ventilation leak. At closure, sutures and dressing were removed, the DLT was withdrawn to the glottis under direct visualization, and the tracheostomy tube was reinserted through the stoma using the DLT as a guide. Correct tracheostomy tube placement was confirmed by EtCO₂ and the absence of subcutaneous emphysema. Neuromuscular blockade was reversed, and the patient was transferred to the ICU (Figure 1).



Figure 1- Chest CT, sagittal view bronchopleural fistula.

Case 2

A 27-year-old male (ASA III) with left pulmonary contusion, left pneumothorax, and left lung abscess was scheduled for thoracotomy and abscess evacuation following a traffic accident. A tracheostomy had been placed 25 days prior for prolonged ventilator dependence. Induction and initial Fogarty catheter placement were performed identically to Case 1; adequate lung isolation was again unachievable.

The same rescue strategy was applied: tracheostomy decannulation, orotracheal left-sided 37 Fr DLT insertion confirmed by fiberoptic bronchoscopy, and temporary stomal closure.

OLV was established by clamping the bronchial lumen, and pressure-controlled ventilation was maintained throughout thoracotomy. Post-procedural tracheostomy recannulation was guided by the DLT under direct visualization and confirmed by EtCO₂ and the absence of subcutaneous emphysema. The patient was transferred to the recovery room on supplemental oxygen via a tracheostomy mask (Figure 2).

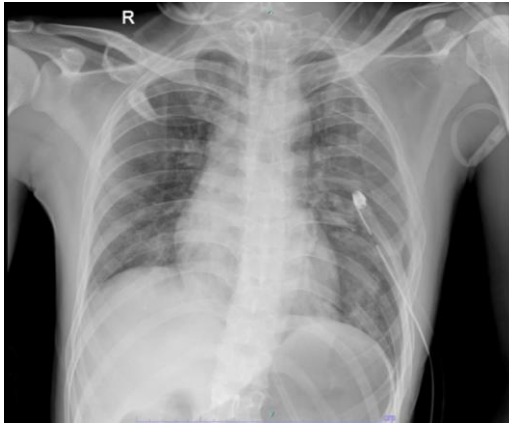


Figure 2- Chest X-ray, left lung abscess.

Discussion

OLV in patients with tracheostomy is technically demanding and infrequently reported [4-5]. Bronchial blockers are the preferred first-line approach in this setting, as they can be advanced through the tracheostomy cannula without decannulation; however, their availability is not universal. When standard bronchial blockers are unavailable, Fogarty catheters have been used as improvised substitutes [6]. In both cases presented here, the Fogarty cuff was insufficient to occlude the target bronchus, likely due to a mismatch between catheter cuff diameter and the wider bronchial lumen in young adult males. This finding underscores the limitations of Fogarty catheters as bronchial blocker surrogates, particularly in patients with large airway dimensions.

The rescue strategy employed—temporary tracheostomy decannulation, orotracheal DLT insertion, and stomal occlusion—has been described previously but rarely documented in resource-limited settings or in patients with concurrent neurological impairment [7-8]. Key technical requirements include: (1) a mature tracheostomy tract (>7 days) to permit safe decannulation and recannulation without tract disruption; (2) airtight stomal closure to prevent ventilation leak, achieved with primary sutures and sterile dressing in both cases; and (3) prospective recannulation planning using the DLT as a guide to avoid blind stoma instrumentation. Campos et al. recommend bronchial blocker-first strategies for long-term tracheostomy, with DLT as an acceptable alternative when absolutely indicated [4]—consistent with the stepwise approach described here. This technique is not applicable in patients with total laryngectomy, for whom orotracheal access is anatomically unavailable; single-lumen tube advancement into the mainstem bronchus via the stoma is the preferred alternative in such cases [9-10].

The resource-limited context is a clinically important variable in this report. Where fiberoptic bronchoscopy and DLT are available but dedicated bronchial blockers

are not, the described technique constitutes a feasible and reproducible rescue pathway. Limitations include the two-case sample size and the absence of intraoperative airway pressure data.

Conclusion

In patients with long-term tracheostomy requiring OLV in resource-limited settings, temporary decannulation with orotracheal DLT insertion, fiberoptic bronchoscopy confirmation, and temporary stomal occlusion constitutes a safe and reproducible rescue strategy when dedicated bronchial blockers are unavailable. This approach requires a mature tracheostomy tract, meticulous stomal management, and a prospective recannulation plan. It is not applicable in patients with a total laryngectomy. Structured preoperative planning and multidisciplinary coordination are essential to its safe execution.

Ethics approval and consent to participate

Written informed consent was obtained from patients (or their legal guardians) for the publication of clinical information and imaging in this report.

Authors' contributions

Concept and design: ARA, SP; Literature review: ARA; Manuscript compilation: ARA; Editing and proofreading: ARA, SP.

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