

One-lung ventilation in a patient with a large mass on the glottis

A case report

Zhuo Liu, MD*, Xiaochun Yang, MD, Qianqian Jia, MD

Abstract

Rationale: One-lung ventilation (OLV) is required during most thoracic surgeries to facilitate surgical visualization by collapsing the lung. Double-lumen tubes and bronchial blockers are two commonly used devices for OLV; however, it may be difficult to place two devices in patients with narrow inlets, such as those that have tumor-induced airway stenosis.

Patient concerns: We report the case of an adult patient with a lung tumor that was growing rapidly and hemorrhaging; thus, a thoracotomy for lung resection should have been performed as early as possible. However, a large mass on the glottis obstructed the entry of the double-lumen tube or bronchial blocker. Therefore, the operation could not be performed because of the inability to provide one-lung ventilation via the conventional intubation method.

Diagnoses: Computed tomography (CT) revealed a lung tumor that was growing rapidly and preoperative bronchoscopy showed a large mass on the vocal cords.

Interventions: After anesthesia induction, a Uniblocker and a small single lumen tube were intubated and the Uniblocker was inserted extraluminally of the single lumen tube. One-lung ventilation was achieved successfully in this patient.

Outcomes: The surgery proceeded uneventfully for 4 hours without any complications.

Lessons: Extraluminal use of the Uniblocker and a small single lumen tube may be recommended for patients receiving OLV and who have narrow inlets, especially under emergency situations.

Abbreviations: FOB = fiberoptic bronchoscopy, ID = inner diameter, OLV = one-lung ventilation, SLT = single lumen tube.

Keywords: extraluminal Uniblocker placement, large mass on glottis, one-lung ventilation

1. Introduction

The double-lumen tube and bronchial blocker are 2 commonly used devices for one-lung ventilation (OLV).^[1,2] However, it may be difficult to place 2 devices in a patient with narrow inlets,^[3] such as in a patient with tumor-induced airway stenosis. This case described a method that achieved OLV via an extraluminal use of the Uniblocker and a small single lumen tube in a patient with a large mass on the glottis. This method may be recommended for patients receiving OLV and who have a narrow inlet, especially under emergency situations.

Editor: N/A.

Competing interests: The authors declare that they have no competing interests

The authors have no funding and no conflicts of interest to disclose.

Department of Anesthesiology, The First Hospital of Qinhuangdao, Qinhuangdao, Hebei, China.

* Correspondence: Zhuo Liu, The First Hospital of Qinhuangdao, Qinhuangdao, Hebei, China (e-mail: liuzhuo2011@yeah.net).

Copyright © 2018 the Author(s). Published by Wolters Kluwer Health, Inc. This is an open access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

Medicine (2018) 97:36(e12237)

Received: 27 April 2018 / Accepted: 14 August 2018

<http://dx.doi.org/10.1097/MD.00000000000012237>

2. Case report

A 51-year-old patient, height 171 cm, weight 71 kg was scheduled for lung cancer surgery. Because the lung tumor was growing rapidly and hemorrhaging, surgery should have been performed as soon as possible; however, preoperative bronchoscopy showed a large mass on the vocal cords (Fig. 1A), which posed a special challenge for the anesthesiologist to achieve OLV. The patient was screened by a senior anesthesiologist preoperatively. In the operating room, the patient was monitored via standard monitoring systems, including invasive arterial blood pressure, heart rate, electrocardiogram, and peripheral oxygen saturation. After determining that mask ventilation would be possible, the patient was administered midazolam 0.05 mg kg⁻¹, fentanyl 3 μg kg⁻¹, cisatracurium 0.2 mg kg⁻¹, and etomidate 0.3 mg kg⁻¹. The intubation steps were conducted as follows: a Uniblocker was inserted with the tip downwards via video laryngoscopy until the tip crossed the mass; second, a single lumen tube (SLT, inner diameter, 5.5 mm, lubricated with silicone) was advanced smoothly until the cuff passed the glottis (Fig. 1B); third, a fiberoptic bronchoscopy (FOB) was inserted into the SLT to adjust the Uniblocker to an optimal position (Fig. 1C), the Uniblocker and SLT were fixed to the patient's mouth with a cloth tape (Fig. 1D).

During the OLV, the tidal volume was set to 360 mL and the respiratory rate was set at 14 bpm. OLV was satisfactory during surgery, with the S_PO₂ maintained at 96% to 98% and peak inspiratory pressures maintained at 25 to 26 cm H₂O. The surgery proceeded uneventfully after 4 hours without any complications.



Figure 1. (A) A mass on the vocal cords; (B) varying views during intubation via the video laryngoscope; (C) the cuff of the Uniblocker located below the carina via fiberoptic bronchoscopy; (D) the fixed Uniblocker and single lumen tube in the patient's mouth with a cloth tape.

This study was approved by the local medical ethics committee of the First Hospital of Qinhuangdao, and informed consent was provided by the patient.

3. Discussion

The Univent tube was easier to place, especially in this patient who had difficult airways,^[4] as the bronchial blocker was advantageous compared to the double lumen tube.^[5] However, in the conventional intubation method, the bronchial blocker needs to be inserted into the lumen of the SLT and a fiberoptic bronchoscopy also needs to be inserted into the lumen of the SLT simultaneously to guide the bronchial blocker to an optimal position, as it is difficult to control the bronchial blocker and FOB simultaneously within the lumen of a small SLT. Therefore, the ID of the SLT was at least 7.5 mm^[6,7] which was too big to pass the narrow inlets in this patient. Extraluminal use of the Uniblocker

was more advantageous than the convention intubation method in this case. First, for extraluminal use of the Uniblocker, we selected a small SLT (ID 5.5 mm). Second, the Uniblocker was easily positioned without the limited of the SLT. Third, the SLT lumen was unobstructed, allowing passage of a suction catheter to clear the secretions and hemorrhage intraoperatively.

There are 2 limitations for this method. First, this method does not apply to patients whose glottis is invisible during intubation. Second, we cannot assess trachea injuries for extraluminal use of a Uniblocker.

4. Conclusion

This case was reported to highlight that extraluminal use of a bronchial blocker and a small SLT may be recommended for patients receiving OLV and who have narrow inlets, especially under emergency situations.

Author contributions

Investigation: Zhuo Liu, Qianqian Jia.

Methodology: Zhuo Liu.

Writing – original draft: Zhuo Liu.

Writing – review & editing: Zhuo Liu.

Data curation: Xiaochun Yang, Qianqian Jia.

References

- [1] Brodsky JB. Lung separation and the difficult airway. *Br J Anaesth* 2009;103:i66–75.
- [2] Campos JH, Hallam EA, Ueda K. Lung isolation in the morbidly obese patient: a comparison of a left-sided double-lumen tracheal tube with the Arndt[®] wire-guided blocker. *Br J Anaesth* 2012;109:630–5.
- [3] Benumof JL. Difficult tubes and difficult airways. *J Cardiothorac Vasc Anesth* 1998;12:131–2.
- [4] Ransom ES, Carter SL, Mund GD. Univent tube: a useful device in patients with difficult airways. *J Cardiothorac Vasc Anesth* 1995;9:725–7.
- [5] Campos JH. Lung isolation techniques for patients with difficult airway. *Curr Opin Anaesthesiol* 2010;23:12–7.
- [6] Tobias JD. Variations on one-lung ventilation. *J Clin Anesth* 2001;13:35–9.
- [7] Liu Z, He W, Jia Q, et al. A comparison of extraluminal and intraluminal use of the Uniblocker in left thoracic surgery: A CONSORT-compliant article. *Medicine (Baltimore)* 2017;96:e6966.