

Stepwise LMA-fiberoptic bronchoscopy-double-lumen tube airway management for one-lung ventilation in a young patient with pulmonary hydatid cyst: a case report

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Cite this article: Ensarioğlu M, Alagöz A. Stepwise LMA-fiberoptic bronchoscopy-double-lumen tube airway management for one-lung ventilation in a young patient with pulmonary hydatid cyst: a case report. *J Pulmonol Intens Care.* 2026;4(3):88-91. doi:10.51271/JOPIC-0086

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Received: 24/04/2026

Accepted: 11/08/2026

Published: 20/08/2026

ABSTRACT

Airway management in thoracic surgery becomes challenging when the underlying pathology affects the airway, with additional complexity introduced when one-lung ventilation is required for surgical access. This report describes a 19-year-old male with no prior health issues, in whom a routine pre-employment chest radiograph identified a mass in the right upper zone. Further imaging with thoracic computed tomography revealed a 15×7 cm lesion in the right upper lobe's posterior segment, leading to compression of the trachea. The patient was referred for video-assisted thoracoscopic evaluation with an initial diagnosis of cystic lung disease. An airway management plan was prepared preoperatively, including a laryngeal mask airway (LMA), fiberoptic bronchoscope (FOB), bronchial blocker, and double-lumen tube (DLT). After standard monitoring, preoxygenation, and induction with midazolam, fentanyl, and propofol, an LMA was placed, and FOB examination showed near-complete extraluminal obstruction of the right main bronchus, with the left main bronchus remaining patent. The patient underwent video-assisted thoracoscopic surgery (VATS) for cyst resection, and postoperative analgesia was provided via ultrasound-guided erector spinae plane block (ESPB). Histopathological examination of the resected material confirmed the diagnosis of pulmonary hydatid cyst. This step-by-step approach, utilizing LMA, FOB, and DLT sequentially, can effectively maintain airway security in cases where mass-related airway compression complicates lung isolation during thoracic procedures.

Keywords: Airway management, one-lung ventilation, bronchoscopy, pulmonary hydatid cyst, echinococcosis

INTRODUCTION

Airway management in thoracic surgery plays a paramount role in overall patient care, especially in cases requiring one-lung ventilation; proper airway control is required before an intervention can be performed.^{1,2} While it is possible for cases operated on for parenchymal pathologies to be managed relatively similarly to each other, when a patient is to be operated on for an airway pathology, the airway management itself may be difficult.³ This issue becomes more prominent when one-lung ventilation is required for the procedure itself, further complicating the already difficult approach. In this case report, airway management of with a bronchopleural mass will be presented.

CASE

A 19-year-old male patient with no known diseases was evaluated for an initial workplace health check-up at 175 cm height and 56 kg weight. In the requested routine chest x-ray, a mass was present on the right upper zone and the patient was referred to a hospital for further evaluation. At the investigation performed at the referred hospital, a computed thorax tomography was performed, in which a

15×7 cm mass in the right upper lobe posterior segment was reported, causing mass compression on the trachea and near-complete narrowing of the right main bronchus (**Figure 1, 2**). The patient was then referred to our centre for diagnostic and therapeutic evaluation, with an initial video-assisted thoracoscopy (VATS) plan.

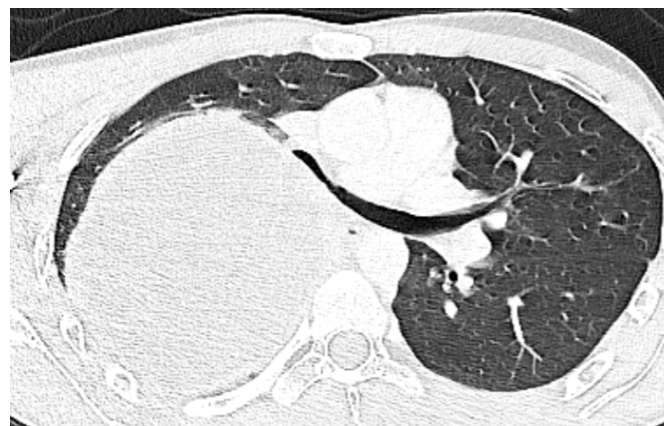


Figure 1. Tomography slice showing airway obstruction
The tomography slide presents an evident obstruction in the right main bronchus

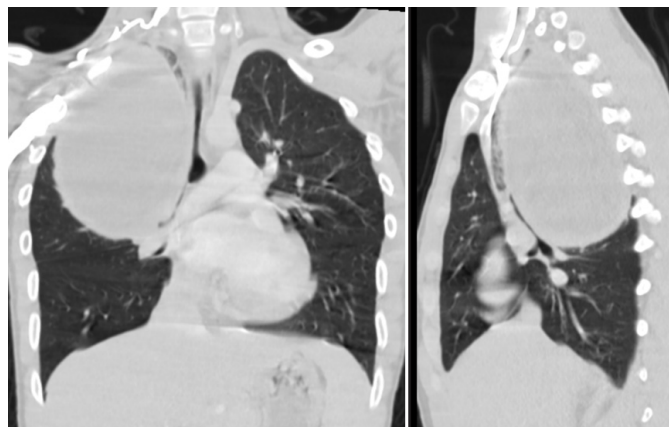


Figure 2. Reconstructed tomography slices

Reconstructed tomography slides show obstruction at the tracheal level, which also limits access to right lung structures. The mass occupies most of the right upper lobe

The patient was preoperatively evaluated at the anesthesia outpatient clinic. He was asymptomatic, with no dyspnoea, stridor, cough or positional symptoms and unrestricted exercise tolerance. Peripheral oxygen saturation on room air was 96%, and complete blood count, biochemistry and coagulation parameters were all within normal limits. Airway examination revealed a Mallampati class 2 oropharyngeal view, an upper lip bite test of class 1 and unrestricted head and neck movement, with no predictors of difficult facemask ventilation. Pulmonary function testing and preoperative arterial blood gas analysis were not obtained: the patient was young, asymptomatic and functionally stable.

A preoperative pulmonary risk score was calculated: the ARISCAT index yielded 47 points, comprising 24 points for the intrathoracic approach and 23 points for an operative duration exceeding three hours, with age ≤ 50 years, absence of respiratory infection in the preceding month, absence of anemia, a preoperative room-air SpO₂ of 96%, and non-emergency surgery each contributing no points. Hydatid disease was not the leading preoperative consideration; thus, serological testing (indirect haemagglutination or ELISA) was consequently not performed before surgery. After planning with senior anesthesiology consultants, the patient was given an ASA score of II and airway equipment additional to the double lumen tube (DLT) was considered for detailed investigation of the airway and lung separation, including laryngeal mask airway (LMA), fiberoptic bronchoscopy (FOB) and bronchial blocker, was prepared.

After standard ASA monitorization and preoxygenation, IV 2 mg midazolam, 1 mcg/kg fentanyl, and 2 mg/kg propofol were given intravenously for induction. LMA was then introduced for airway preservation and FOB was utilized through it to investigate the nature of the mass and if the airway would be adequate for double-lumen tube (DLT) lung separation. If the airway later was to be determined insufficient for DLT, a bronchial blocker would have been used. FOB revealed that the right main bronchus was mostly obstructed by extraluminal compression, while the left main bronchus was spared with adequate lumen preservation. The LMA was then removed, facemask ventilation was performed successfully, and after rocuronium 0.6 mg/kg and an additional 100 mg propofol intravenously, a 39 Fr left-sided DLT was inserted. The tube size was chosen to minimize airway trauma. DLT

placement was confirmed by FOB, and lung separation was confirmed by deflation of the right lung.

During one-lung ventilation, volume-controlled ventilation was delivered according to lung-protective principles, with a tidal volume of 4-6 ml/kg ideal body weight, 5 cmH₂O of positive end-expiratory pressure, and plateau inspiratory pressure maintained below 30 cmH₂O. The inspired oxygen fraction was titrated to the lowest value that maintained peripheral oxygen saturation above 92%. At the conclusion of surgery, a manual recruitment maneuver was performed, sustaining an inspiratory pressure of 30 cmH₂O for 10 seconds.

VATS was then performed to preserve the cyst's location. On thoracoscopic inspection, the lesion appeared as a smooth, white cyst with a tense surface, an appearance characteristic of hydatid disease. This led to a preliminary diagnosis of pulmonary hydatid cyst and prompted the surgical team to isolate the operative field before any manipulation of the lesion. Methylprednisolone 1 mg/kg and pheniramine hydrogen maleate 45.5 mg were then administered intravenously as prophylaxis against an anaphylactic reaction, and adrenaline, vasopressors and intravenous fluids were prepared and immediately available.

Thoracotomy under VATS imaging was then performed for cyst localization and resection. Following field isolation, the cyst contents were aspirated in a controlled manner, and the germinative membrane was removed intact (**Figure 3**). There was no uncontrolled spillage and no allergic, respiratory, or hemodynamic disturbance at any point. The total operative duration was four hours. After completion of the surgical intervention, an ultrasonography-guided erector spinae plane block (ESPB) was used for analgesia. Sugammadex was used to reverse neuromuscular blockade. The patient was extubated after confirmation of spontaneous respiration with sufficient tidal volume and spontaneous eye opening. The patient was then admitted to the thoracic surgery intensive care unit as part of routine follow-up. Histopathological examination of the resected material confirmed the diagnosis of pulmonary hydatid cyst. The postoperative course was uneventful, with no respiratory complications.



Figure 3. Intraoperative appearance of the excised hydatid membrane

The germinative (laminated) membrane of the pulmonary hydatid cyst, removed after controlled aspiration of the cyst contents and shown in a surgical dish. The smooth, avascular, pearly-white membrane is characteristic of *Echinococcus granulosus* and supported the intraoperative diagnosis, which was subsequently confirmed by histopathological examination

DISCUSSION

Proper airway management plays a crucial role in patients undergoing surgical interventions, especially so in the cases of hydatid cysts and similar infectious causes that require not only one-lung ventilation but also local control of the disease during the procedure to prevent complications.⁴ The need for one-lung ventilation itself brings some possible complications to the table, among which some may be caused by the utilized double-lumen intubation tube and possible airway trauma caused by it.^{2,3} However, the advantages given by one-lung ventilation, which not only allows one thoracic side to be operated on but also, in the case of hydatid cyst, keeps the other lung safe from possible ruptures, often outweighs the disadvantages.

The justification of resection in hydatid cyst is mainly the control of the disease and to provide a curative approach. However, due to the disease's symptoms being non-specific, the initial approach would be same to any cystic disease of the lung.⁵ In case of hydatid diseases, the local control of the disease is essential, and like reported in our case, further imaging even intraoperative may be required for a differential diagnosis.^{4,6} In the present case, hydatid disease was not the leading preoperative consideration; the patient was referred with a working diagnosis of cystic lung disease, and serological testing was therefore not obtained before surgery. Suspicion in our patient was first raised by the thorascopic appearance of the lesion and the diagnosis was ultimately established by histopathological examination of the resected material.

Supraglottic airway devices have been routinely used in anaesthesiology for ease of maintaining the airway during short-lasting procedures. The approach to a possibly occluded airway requires further expertise in airway management and often demands multiple combinations of methods.⁷ Awake intubation or utilization of LMA and other supraglottic devices before intubation have been successfully used, with the combination of fiberoptic intubation and LMA being defined as a handy technique for anticipated complex cases, as was our case.⁸

Operations on pulmonary hydatid cysts have routinely been performed with double-lumen endotracheal tubes, as reported in the literature, and with an emphasis on possible anaphylaxis. In a study by Tercan et al.,⁹ six patients out of 393 had an allergic reaction, including anaphylaxis, in the peri-operative period. One of the six patients was lost despite antihistaminic corticosteroid and vasopressor treatment.⁹ An additional benefit of DLT intubation was reported in a case report: the isolation of the operated lung prevented the spill-over of an intraoperative cyst rupture, in which the patient also had pneumothorax of the contralateral lung. As stated by the authors, the management of this case would not have been possible under single-tube lumen intubation.¹⁰ Gupta et al.¹¹ also reported a similar case and suggested that, mainly due to positive pressure ventilation, small fragments of a ruptured cyst could have lodged in the contralateral lung without the protective effect of DLT. Given this risk, prophylaxis with methylprednisolone and pheniramine was administered before surgical manipulation in our patient, and vasoactive drugs and intravenous fluids were prepared in advance. This

proved a reasonable precaution, since definitive treatment required deliberate puncture and aspiration of the cyst.

One-lung ventilation in this setting was conducted according to lung-protective principles, with a reduced tidal volume, applied positive end-expiratory pressure and the lowest inspired oxygen fraction compatible with adequate saturation. Tidal volumes of 4-5 ml/kg predicted body weight with 5-10 cmH₂O of PEEP and routine recruitment are currently recommended to limit ventilator-induced lung injury.¹²

CONCLUSION

A combined approach using appropriate airway equipment and a clear sequence is required to control any possible complications arising from difficult anatomical positioning and mass-related issues. In this case, the airway of a patient with a mass of unknown origin was properly managed, with the airway adequately secured without interfering with the mass. A step-by-step approach using an LMA, FOB, and a left-sided DLT was carefully implemented. Overall, airway management remains a vital component of the approach for patients with a mass of unknown origin.

ETHICAL DECLARATIONS

Informed Consent

Written informed consent was obtained from the patient included in this report. Signed consent forms are retained by the authors and are available upon request.

Peer Review Process

This report underwent external peer review.

Conflict of Interest

The authors declare no conflicts of interest.

Financial Disclosure

This case report did not receive any financial support.

Author Contributions

Concept: ME, AA; Design: ME, AA; Control/Supervision: AA; Data Collection and/or Processing: ME; Analysis and/or Interpretation: ME, AA; Literature Review: ME; Article Writing: ME; Critical Review: All Authors.

REFERENCES

- Huybrechts I, Tuna T, Szegedi LL. Lung separation in adult thoracic anesthesia. *Saudi J Anaesth*. 2021;15:272-279. doi:10.4103/sja.sja_78_21
- Samara E, Valauskaite G, El Tahan MR. Updates in lung isolation techniques. *Best Pract Res Clin Anaesthesiol*. 2024;38:4-17. doi:10.1016/j.bpa.2024.04.002
- Mahmood K, Frazer-Green L, Gonzalez AV, et al. Management of central airway obstruction: an American College of Chest Physicians clinical practice guideline. *Chest*. 2025;167(1):283-295. doi:10.1016/j.chest.2024.06.3804
- Bhende VV, Rathod JB, Sharma AS, et al. Conservative surgical management of a pulmonary hydatid cyst in an adolescent having extra-pulmonary lesions by a multi-disciplinary approach. *Cureus*. 2024;16(4):e58600. doi:10.7759/cureus.58600
- Durhan G, Tan AA, Düzgün SA, Akkaya S, Arıyürek OM. Radiological manifestations of thoracic hydatid cysts: pulmonary and extrapulmonary findings. *Insights Imaging*. 2020;11:116. doi:10.1186/s13244-020-00916-0

6. Sandeep G, Kalbande JV, Gupta A, Singha SK, Bodhey N. Anesthetic management of large bronchogenic cyst with severe tracheal compression in adults: a case report. *Cureus*. 2024;16(6):e62621. doi:10.7759/cureus.62621
7. Shum S, Moreno Garijo J, Tomlinson G, et al. A clinical comparison of 2 bronchial blockers versus double-lumen tubes for one-lung ventilation. *J Cardiothorac Vasc Anesth*. 2023;37:2577-2583. doi:10.1053/j.jvca.2023.08.125
8. Lynch J, Crawley SM. Management of airway obstruction. *BJA Educ*. 2018;18:46-51. doi:10.1016/j.bjae.2017.11.006
9. Tercan M, Tanriverdi TB, Kaya A, Altay N. Our clinical experience and follow-up results in hydatid cyst cases: a review of 393 patients from a single center. *Braz J Anesthesiol*. 2020;70(2):104-110. doi:10.1016/j.bjane.2020.04.003
10. Kaur D, Anand S, Sharma P, Kumar A. Anaesthetic management of intraoperative airway obstruction by ruptured hydatid cyst of right lung and barotrauma induced pneumothorax of the contralateral lung. *Indian J Anaesth*. 2015;59(1):58-59. doi:10.4103/0019-5049.149461
11. Gupta R, Wadhawan S, Bhadoria P. Intraoperative endobronchial rupture of pulmonary hydatid cyst: an airway catastrophe. *J Anaesthesiol Clin Pharmacol*. 2013;29(1):111-113. doi:10.4103/0970-9185.105817
12. Lohser J, Slinger P. Lung injury after one-lung ventilation: a review of the pathophysiologic mechanisms affecting the ventilated and the collapsed lung. *Anesth Analg*. 2015;121:302-318. doi:10.1213/ANE.0000000000000808