

A Fragile Balance: Anesthetic Considerations for Robotic-Assisted Bronchoscopy with a Shared Airway in a Patient with COPD, Blebs, and Active Infection

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Background

Robotic-assisted bronchoscopy has become increasingly common because it enables precise evaluation of peripheral lung nodules, but it poses major anesthetic challenges:

- Shared airway
- Inspiratory holds
- Limited control of ventilation
- Requires a static airway

These risks are amplified in patients with COPD, active respiratory infection, and cardiovascular disease, who have reduced physiologic reserve and are vulnerable to hypoxia, hypercapnia, and hemodynamic instability.

Case Description

- 81-year-old male presenting to the ED with progressive SOB and cough.
- PMHx: COPD with severe positional intolerance, CAD, VTE on Eliquis, rapid AFib.
- Imaging and Labs:
 - Lactate: 4.0 mmol/L
 - CTA shows spiculated nodule in the right middle lobe with mediastinal adenopathy. Negative for PE.
- Plan: robotic-assisted Galaxy bronchoscopy with endobronchial ultrasound (EBUS) and transbronchial parenchymal biopsies.

Learning Objectives

- Discuss the perioperative anesthetic challenges and strategies to mitigate complications in robotic-assisted bronchoscopy for a patient with severe pulmonary disease and a shared airway.

Anesthetic Management

- Preoxygenate in semi-upright position with multiple pillows for comfort and ventilation
- Induction with reduced-dose propofol and etomidate
- Intubate with 8.5 tube
 - Glidescope
 - Reinforced taping
 - Gooseneck with corrugated flex connector
- BIS monitor
- Maintenance with sevo and propofol infusion
- Low PEEP strategy
- Frequent inspiratory holds
- Ensure complete paralysis during biopsy
 - POCUS to rule out pneumothorax prior to extubation

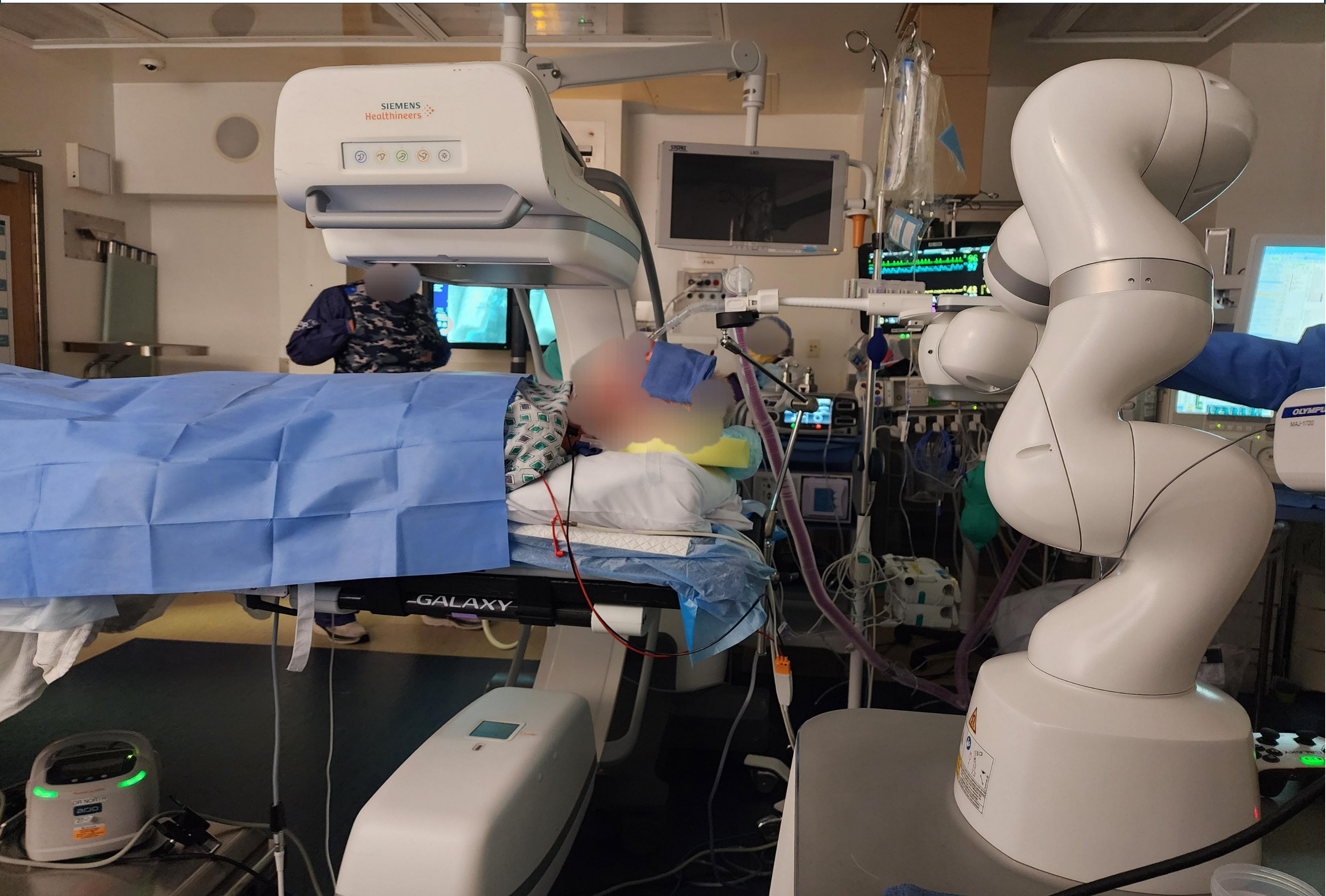


Figure 1. Procedure Setup

Discussion

- Robotic-assisted bronchoscopy creates a **true shared-airway** environment where the robot obstructs the ETT and limits access
 - **Gas delivery** and **ventilation** are **inconsistent** when the robotic bronchoscope both **partially obstructs and creates a leak in the ETT**
- Patient with limited pulmonary reserve and positional intolerance requires the use of **ramped position with multiple pillows** for comfort and to preserve ventilatory mechanics.
- A **hybrid anesthetic** with **low-dose sevoflurane + propofol infusion** provides more reliable depth, prevents coughing, minimizes movement, and reduces hemodynamic swings, with depth guided by **BIS Monitoring**.
- Induction **with etomidate and low-dose propofol** minimizes hypotension in a frail, hemodynamically unstable patient.
- Although **VESPA** trial principles **recommends high tidal volume and high PEEP (10-12)** for bronchoscopy, this was contraindicated due to blebs and active infection.
 - Low PEEP and VT were used to accommodate patient's respiratory limitations
- **Frequent inspiratory holds** required for robotic navigation increase risk of hyperinflation and desaturation, necessitating tight hemodynamic and ventilatory coordination with the proceduralist
- **POCUS** via EBUS should be utilized **to confirm intact pleura** with visible lung sliding prior to extubation, especially in someone with multiple blebs.
- Multiple bronchoalveolar lavages further reduced post-procedural reserve.
 - **Low threshold for reintubation** was maintained
- Close collaboration between anesthesiologist and proceduralist was essential to maximize both safety and diagnostic yield.

References

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