

Acute Airway Management of Anterior Mediastinal Mass in the Setting of Opioid-Induced Acute Respiratory Failure.

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Introduction

- **Anterior mediastinal masses (AMM)** conventionally have been managed with **awake fiberoptic bronchoscopic intubation**, and preservation of **spontaneous ventilation**.^{1,2} Recent data demonstrates that application of **positive pressure ventilation**, and administration **of paralytic agents** do **not reduce tracheal diameter** in this population.^{3,4}
- We present a 62-year-old female with **a large AMM requiring intubation**, share our experiences using **high-flow nasal cannula** to provide oxygenation and **ventilation throughout fiberoptic bronchoscopy**, and review emerging data that is relevant to the management of this high-risk patient population.

History of Present Illness

62-year-old female with high grade **metastatic leiomyosarcoma**, **large AMM** (15.5x2.3x14cm), and **anterior neck mass** (10x6.8x8.5cm) presented to outside hospital for back pain. Found to be hypotensive, tachycardic, and pancytopenic. Transferred to Columbia University Irving Medical Center (CUIMC) 3/16 for oncologic management and arrived with **altered mental status and in severe pain**.

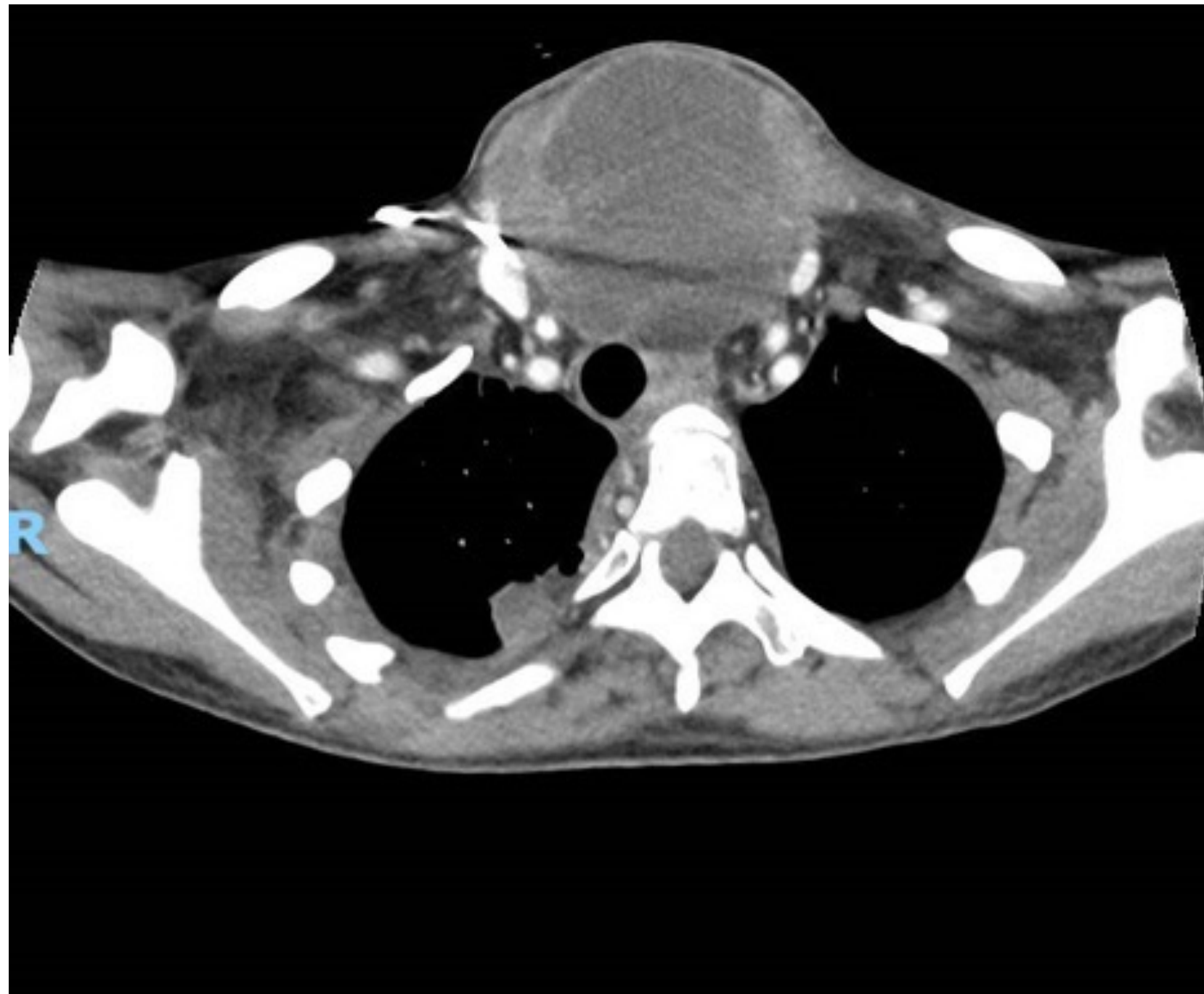


Figure 1: CT Chest. Official read noted tracheal mass effect and left-shifted heart.

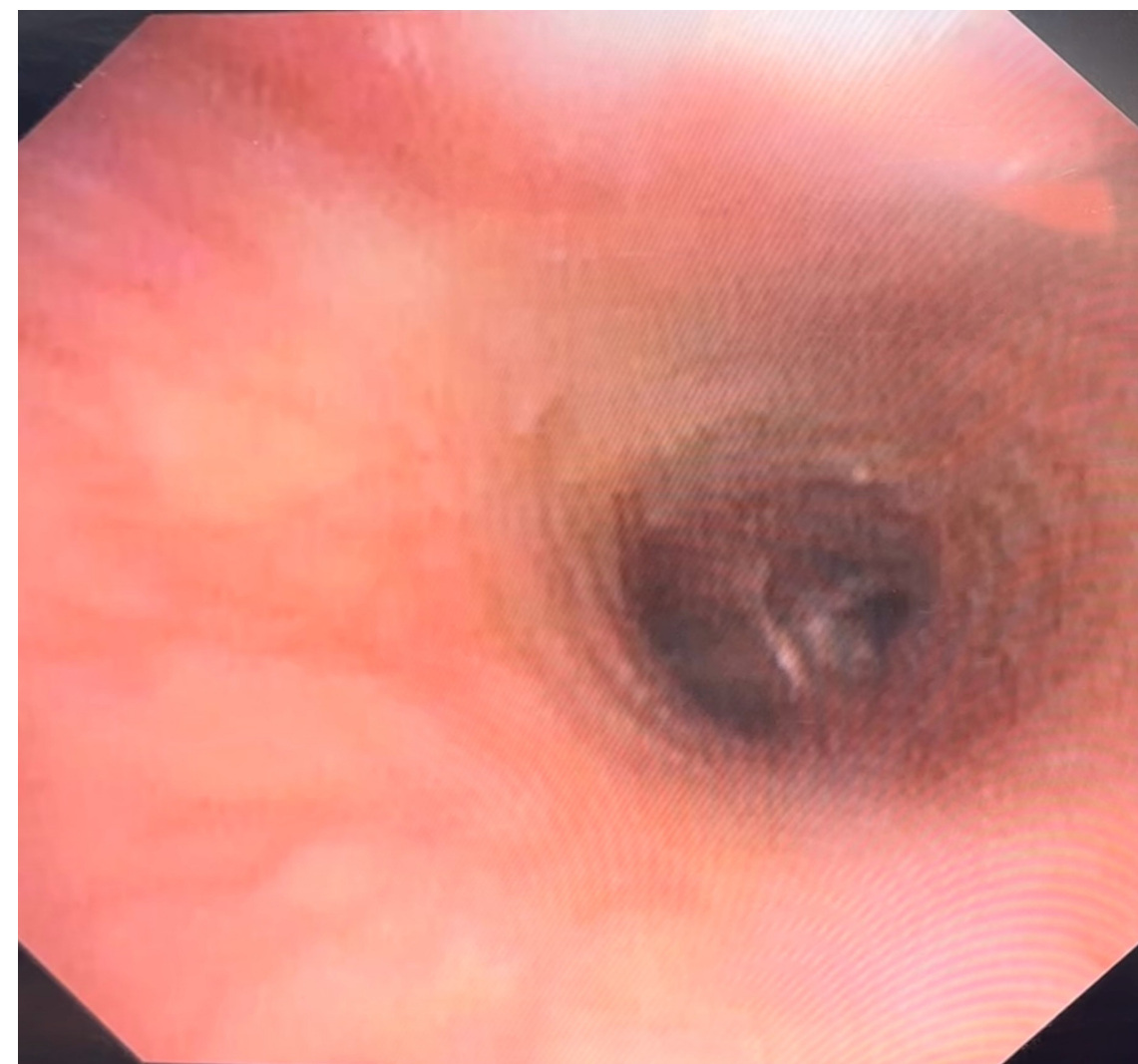
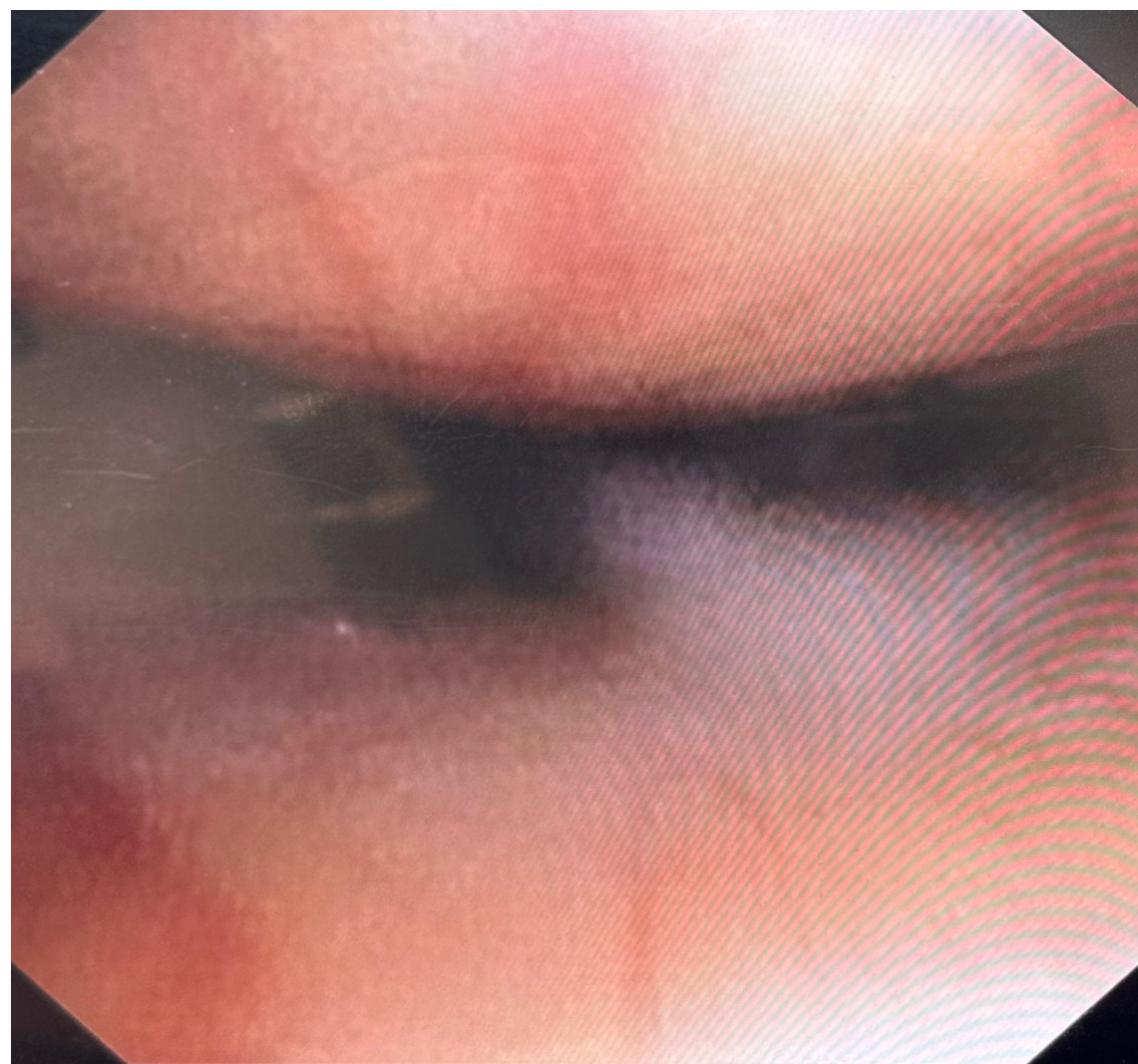


Figure 2: Bronchoscopy view of anterior mediastinal mass (left), and airways distal to mass (right).

Learning Points

- **Patients with AMM are at risk for airway compromise during induction of anesthesia.**
- **Those in the unsafe/uncertain category should have two anesthesiologists and a perfusionist present on induction, with CPB available.**
- **Preservation of spontaneous ventilation during awake fiberoptic bronchoscopy and an armored ETT sized to trachea are best.**
- **Positive pressure ventilation and neuromuscular blockade may be safely employed if needed. Watch for lung hyperinflation.**

March 16

- 1700 – SpO2 93% on 5lpm nasal cannula. A&Ox2 (baseline) in significant pain. Extended-release morphine 60mg PO continued from OSH.

March 17

- 0700 – **13.6 mg Hydromorphone total**

March 18

- 0100 - 0800 – **8mg Morphine bolus x 3**
- 0800 – Patient unresponsive, with shallow respirations. ABG, Narcan.
- 0900 – **ABG: 7.13/>105/119**. Rapid Response, started NRB, 0.4mg Narcan. Anesthesia consulted for difficult airway.
- 1025 – Not BiPAP candidate d/t AMS. HFNC started, 85% FiO2, 60lpm.
- 1055 – Transferred to OR on HFNC: ENT team on standby.

In Operating Room

- 1100 – **In OR: HFNC continued.** . **Fiberoptic bronchoscope** advanced through oropharynx. Topicalized with 2% lidocaine. Initial visualization challenging due to anterior mass. Fiberoptic bronchoscope past cords on third attempt. **6.0 reinforced anode ETT** advanced over fiberoptic..
- 1135 – ABG: 7.37/70/85
- 1215 – Transfer to ICU on full monitors.

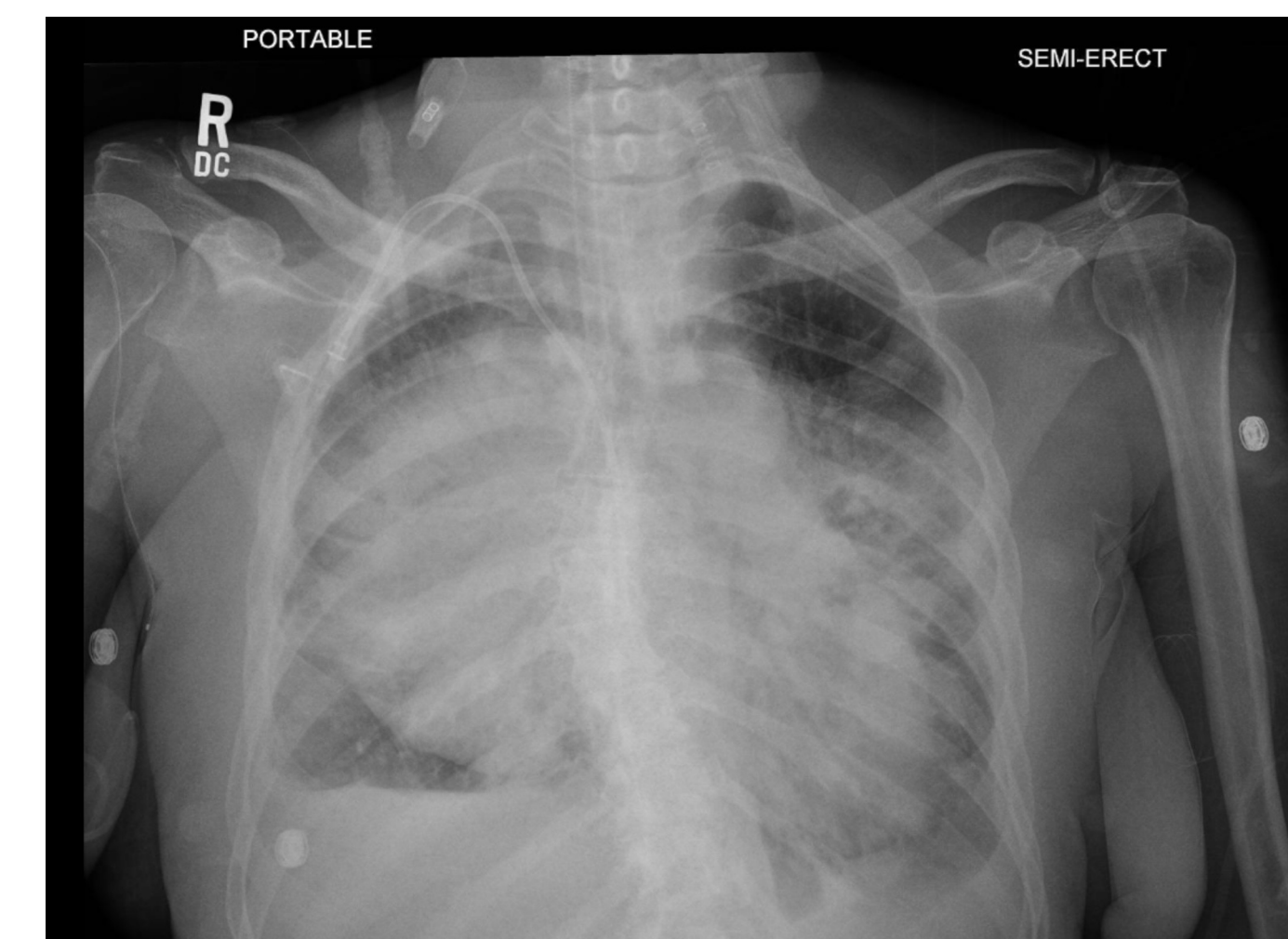


Figure 3: Chest Xray

Discussion

Conventional Management⁵

- ETT sized based on tracheal diameter at level of obstruction per imaging.
- **Mediastinal Mass Syndrome risk classification:**
 - **Safe:** Asymptomatic adults
 - **Unsafe:** Symptomatic adults
 - **Uncertain:** Adults with moderate symptoms, Asymptomatic adults with obstruction of tracheobronchial tree (<50% normal), abnormal diagnostic evaluation, or adults without the possibility of diagnostic evaluation.
- Second anesthesia staff member and perfusionist present for uncertain and unsafe cases.
- Avoid sedatives or muscle relaxants.
- Venous access in lower extremity. Reserve one lower extremity for possible cardiopulmonary bypass. Fully-prepared CPB machine for “unsafe” patients.
- Establish a “rescue” position prior to induction.
 - Position patient and see how it affects comfort/obstruction.
- Maintain normal muscle tone and spontaneous breathing, use short-acting agents for anxiolysis.
- Awake fiberoptic intubation with visualization of the tip of the ETT bypassing obstruction prior to full induction of anesthesia.

Emerging Evidence⁴

- New evidence suggests there may not be a significant decrease in anterior-posterior tracheal diameter after induction of general anesthesia, application of positive pressure ventilation, or after neuromuscular blockade compared with an awake and spontaneously breathing patient.
- Positive pressure ventilation increases risk of air trapping. Ventilator settings should be adjusted to target patient’s spontaneous volume, rate, and I:E ratio.
- Spontaneous ventilation remains the preferred form of ventilation, but primarily to prevent hyperinflation. Positive pressure ventilation and neuromuscular blockade appear to be safe if they are required during induction, provided you closely monitor for symptoms of lung hyperinflation and allow for adequate expiration.

References

1. Slinger P, Karsli C. Management of the patient with a large anterior mediastinal mass: recurring myths. Curr Opin Anaesthesiol. Feb 2007;20(1):1-3. doi:10.1097/ACO.0b013e328011390b
2. Erdős G, Tzanova I. Perioperative anaesthetic management of mediastinal mass in adults. Eur J Anaesthesiol. Aug 2009;26(8):627-32. doi:10.1097/EJA.0b013e328324b7f8
3. Sarkiss M, Jimenez CA. The evolution of anesthesia management of patients with anterior mediastinal mass. Mediastinum. 2023;7:16. doi:10.21037/med-22-37
4. Hartigan PM, Karamnov S, Gill RR, et al. Mediastinal Masses, Anesthetic Interventions, and Airway Compression in Adults: A Prospective Observational Study. Anesthesiology. Jan 01 2022;136(1):104-114. doi:10.1097/ALN.0000000000004011
5. Erdős, Gabora; Tzanova, Ireneb. Perioperative anaesthetic management of mediastinal mass in adults. European Journal of Anaesthesiology 26(8):p 627-632, August 2009. | DOI: 10.1097/EJA.0b013e328324b7f8