

CLINICAL VIGNETTE

Spinal Anesthesia in Patient with Mediastinal Mass for Non-Thoracic Surgery

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Introduction

Anesthetic management for mediastinal masses poses up to a 14% risk for perioperative complications, with the most serious being vascular or respiratory obstruction.¹ There is greater compressibility of the airway with an overlying mass that can lead to respiratory compromise. Under general anesthesia, this is compounded by a supine position, decreased transpleural pressure gradient from diaphragm paralysis leading to smaller caliber airways and reduced lung volume, and relaxation of the bronchial smooth muscle.² There is no clear algorithm for anesthetic plans in patients with such masses.

Case

A 42-year-old female was scheduled for a hysteroscopic polypectomy and possible dilation and curettage for the management of a uterine intracavitary lesion. The patient's past medical history included beta thalassemia trait anemia, pituitary adenoma (most likely prolactinoma) well-controlled hypothyroidism, anxiety (taking lorazepam), and a 5.0 x 5.4 cm right paratracheal mass.

The right paratracheal mass was found incidentally on chest x-ray two years prior for assessment of cough with productive sputum. The mass was further characterized with a computed tomography scan and magnetic resonance imaging that showed a largely cystic mass with a solid component and uneven thickening concerning for a neoplastic process. Thoracic surgery recommended a right thoracotomy for resection. However, the patient declined surgery as she was without major symptoms and the mass had been previously noted as a child in a foreign country. The patient was undergoing surveillance imaging every six months. The patient has recent wrist surgery without surgical or anesthetic complication five weeks prior to presenting for management of the uterine lesion. However, it was unclear what type of anesthesia was used for the wrist surgery.

On physical examination on the day of surgery, included weight 73kg and height 161cm. She had full range of motion of her neck and her lungs were clear to auscultation. The patient had a short thyromental distance and her Mallampati score was three. She reported no respiratory symptoms while awake but slept on her side rather than on her back due to shortness of breath. We discussed our main anesthetic concern was respiratory compro-

mise and proceeded with spinal anesthesia to allow the patient to spontaneously breathe during the case to reduce risk of respiratory compromise given her mediastinal mass.



Figure 1. Right paratracheal mass abutting upper trachea, right innominate vein and esophagus.

The patient was brought to the operating room and positioned on the operating table in the sitting position. The patient reported feeling anxious and 2 mg of midazolam was administered intravenously. Her back was sterilely prepped and draped. A midline approach was taken with a 22 gauge spinal needle at the L3-L4 level with clear cerebral spinal fluid flowing freely without any blood. 1.5 ml of 0.75% bupivacaine with dextrose was injected into the intrathecal space. After securing the dressing, the patient was placed in the lithotomy position with the head slightly elevated. During this time the patient's heart rate increased from low 90s to 170s beats per minute with a narrow complex. A total of 30 mg of esmolol and an additional 2 mg of midazolam were administered intravenously. Her heart rate reduced to the 140 range with all other vital signs stable. Carotid massage was attempted with limited effects. The procedure was performed by Gynecology

without any complications. The patient was asymptomatic throughout the procedure, denying any respiratory or cardiac symptoms. Post procedure, the patient was taken to the PACU and a 12 lead EKG showed supraventricular tachycardia and 6mg of adenosine was given. The abnormal rhythm was terminated, and her rhythm returned to normal sinus. The patient was referred to Cardiology for further evaluation as an outpatient.

Discussion

Anesthetic management of patients with large mediastinal masses poses significant challenges.³ Using risk stratification is crucial for safe anesthesia administration. A thorough history and physical exam can be helpful in initial assessment of a patient with a mediastinal masses. It is important to identify symptoms of respiratory or vascular occlusion such as difficulty breathing and facial or upper extremity swelling, the patient's level of activity, and which positions improve or worsen the symptoms. Imaging is also critical in the assessment of mediastinal masses, both for diagnosis of the underlying pathology as well as assessing for associated mass effect on vascular and respiratory structures that could limit options for providing safe anesthesia.

General anesthesia can cause decreased lung volumes, relaxation of bronchial smooth muscle, and changes in transpleural pressure.² Additionally, the supine position can decrease the transverse diameter of the thorax, cause cephalad displacement of the diaphragm, and increase central blood volume. The compression of the airways and blood vessels can be further exacerbated by neuromuscular blockade in a supine patient.⁴

With the potential anesthetic complications associated with mediastinal masses, the patients need to be optimized within the constraints of the specific planned surgery. First, the ideal position of patient needs to be preoperatively determined by both anesthesia and surgical teams. Securing the airway beyond the stenosis while the patient is awake and allowing for spontaneous ventilation is ideal to limit respiratory compromise. Having a rigid bronchoscope and a surgeon available to secure the airway are other important considerations. Use of a rigid bronchoscope allows for use of an airway exchange catheter or pre-mounting of an endotracheal tube onto the bronchoscope. If respiratory compromise develops upon induction, rescue techniques can be used to awaken the patient as rapidly as possible and reposition. If an airway cannot be secured given the location of the mass, use of ECMO may be necessary. High risk patients with acute superior vena cava syndrome, pulmonary artery or right ventricular outflow tract obstruction, airway compression >50%, and cardiac or great vessel involvement/invasion might benefit from the use of ECMO primed in the operating room.⁵ Patients undergoing surgery to resect the mediastinal mass, there are no established management guidelines available.⁶

Fortunately, our case allowed us to use methods other than general anesthesia with an endotracheal tube. Our patient only had mild orthopnea allowing her to tolerate the supine position, albeit on her side only. This patient had greater than 50% of the diameter of her airway intact at the site of the mass. Additionally, the procedure being performed did not involve the mass or the mediastinum. We elected for a spinal anesthetic, allowing for continuous spontaneous respiration, maintenance of airway tone, and chest wall compliance. There were no respiratory complications during the case, highlighting that neuraxial anesthesia can be a useful alternative to general anesthesia for such patients when the surgical procedure allows. Patients undergoing anesthesia with mediastinal masses are still at risk for perioperative complications even if general anesthesia is avoided.

REFERENCES

1. **Béchar P, Létourneau L, Lacasse Y, Côté D, Bussi res JS.** Perioperative cardiorespiratory complications in adults with mediastinal mass: incidence and risk factors. *Anesthesiology*. 2004 Apr;100(4):826-34; discussion 5A. doi: 10.1097/00000542-200404000-00012. PMID: 15087617.
2. **Neuman GG, Weingarten AE, Abramowitz RM, Kushins LG, Abramson AL, Ladner W.** The anesthetic management of the patient with an anterior mediastinal mass. *Anesthesiology*. 1984 Feb;60(2):144-7. doi: 10.1097/00000542-198402000-00012. PMID: 6546480.
3. **Erd s G, Tzanova I.** Perioperative anaesthetic management of mediastinal mass in adults. *Eur J Anaesthesiol*. 2009 Aug;26(8):627-32. doi: 10.1097/EJA.0b013e328324b7f8. PMID: 19384235.
4. **Chao VT, Lim DW, Tao M, Thirugnanam A, Koong HN, Lim CH.** Tracheobronchial obstruction as a result of mediastinal mass. *Asian Cardiovasc Thorac Ann*. 2006 Apr;14(2):e17-8. doi: 10.1177/021849230601400224. PMID: 16551801.
5. **Ramanathan K, Leow L, Mithiran H.** ECMO and adult mediastinal masses. *Indian J Thorac Cardiovasc Surg*. 2021 Apr;37(Suppl 2):338-343. doi: 10.1007/s12055-020-01077-x. Epub 2021 Jan 8. PMID: 33967453; PMCID: PMC8062607.
6. **Tan JC, Lin PS, He LX, Lin Y, Yao YT; Evidence in Cardiovascular Anesthesia(EICA) Group.** Anesthetic management of patients undergoing mediastinal mass operation. *Front Surg*. 2022 Oct 28;9:1033349. doi: 10.3389/fsurg.2022.1033349. PMID: 36386507; PMCID: PMC9649874.