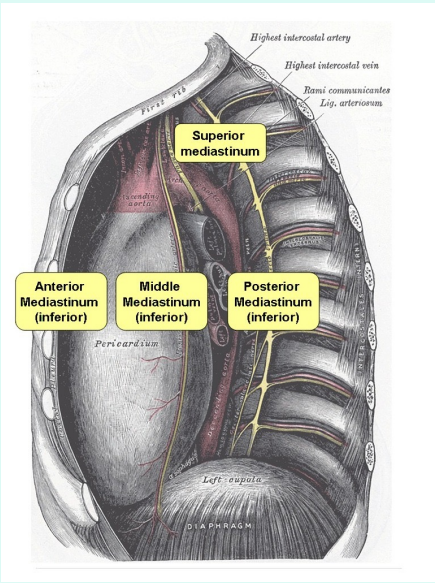
Anterior Mediastinal Mass: Risks of Sedation and Intubation



Source: Gray's anatomy

Sedation or intubation of a patient with an anterior mediastinal mass involves several challenges, including a high risk of respiratory and hemodynamic collapse. **As such, sedation and intubation should only be pursued when absolutely necessary.** Awake intubation is generally the preferred approach. However, if possible, a plan should always be developed in advance with a multidisciplinary team.

Anatomy

The mediastinum contains four compartments: Superior, anterior, middle and posterior.

- Anterior mediastinal borders = Thoracic inlet superiorly, diaphragm inferiorly, sternum anteriorly and middle mediastinum posteriorly.

The main concern with an anterior mediastinal mass is not the effect within that compartment but the effect it has on the middle compartment, which contains the pericardium, heart, great vessels, airway and esophagus. When mass effect on the heart, the right side of the heart is usually more affected than the left side.

Physiologic Interactions

- **Change in Position**: Going from sitting to supine shifts the position of the mass and places pressure on the structures in the middle mediastinum. Can result in compression of airway structures, major vessels (superior vena cava, pulmonary artery, aorta) and heart causing cardiovascular collapse.
- **Induction of anesthesia will exacerbate extrinsic intrathoracic airway compression**: Bronchial smooth muscle relaxes during Induction, allowing greater compressibility of large airways. There are also reduced lung volumes and tracheobronchial diameters.
- **Neuromuscular Blocking Agents:** Paralysis eliminates the caudal movement of the diaphragm seen during spontaneous ventilation, which eliminates the normal transpleural pressure gradient that dilates the airways during inspiration and minimizes the effects of extrinsic intrathoracic airway compression.
- **Decreased Preload:** The situation may already be preload sensitive due to compression of the major vessels and heart. Vasodilation caused by the administration of sedative agents in combination with increased intrathoracic pressure from positive pressure ventilation may result in refractory hypotension/cardiac arrest.

Risk Assessment

Symptom	Possible Cause
Cough and dyspnea	Compression of the trachea or mainstem bronchi, ideally assessed in the supine position
Dysphagia	Esophageal compression
Hoarseness, stridor	Impingement of the recurrent laryngeal nerve or vocal cord edema caused by SVC syndrome
Facial or upper extremity edema	SVC obstruction
Chest pain, syncope, postural symptoms	Direct compression of the heart and major vessels or cardiac tamponade from an associated pericardial effusion .

Investigations:

- CT Neck and Chest: Assess possible airway narrowing, deviation of the airway, narrowing of or compression of vascular structures, pericardial fluid, and compression of the right heart.
- Transthoracic Echo: To better characterize the impact on cardiac structures.

High Risk: Severe postural symptoms, stridor, cyanosis, tracheal compression > 50% or tracheal compression with associated bronchial compression, pericardial effusion or SVC syndrome.

Approach to Management – What is your rescue plan and position?

Avoid intubation in patients with an anterior mediastinal mass unless absolutely necessary. If intubation is required, call for help early and assemble a multidisciplinary team, including Critical Care, Anesthesia, and Thoracic or Cardiovascular Surgery (if available). Consider the need for pre-cannulation for ECMO or cardiopulmonary bypass in the event of a hemodynamic collapse or inability to intubate.

1

Know the Patient's Rescue Position:
Often, there is a position that alleviates the patient's symptoms → Typically sitting or lateral decubitus position. Placing the patient in this position can be a rescue maneuver in a crisis situation. Sometimes, you may require a second stretcher for lateral decubitus or prone positioning if predetermined as a rescue.

2

Supporting the Patient's Hemodynamics: Appoint one person who is responsible for hemodynamic management only.

- Obtain lower extremity venous access and insert an arterial line for continuous monitoring.
- Start IV fluids, have vasopressor infusions and emergency drugs (i.e., epinephrine) ready.
- Choose sedative medications with less impact on hemodynamics (i.e., ketamine or etomidate).

3

Intubation Planning

- **Plan location of intubation:** The OR may be required with a rigid bronchoscope available (provides a conduit for jet ventilation) and ECMO standby.
- **Primary Goal = Maintain spontaneous ventilation with no neuromuscular blockade.**
- Vocalize plans A, B, and C with the team. Mask ventilation may be difficult due to loss of airway patency and/or high pressures needed to overcome the intrathoracic mass effect. Be aware that this may not be an option to fall back on.
- Ideally, patients should be intubated awake and upright.
- If muscle relaxation is absolutely required, consider a short-acting option or have a reversal agent available at the bedside.
- Prepare a reinforced ETT with several sizes available in case of difficulty advancing the ETT due to mass effect or airway collapse. In case of airway compression distal to the ETT, consider a longer micro laryngoscopy tube and/or the need for single lung ventilation (mass effect on unilateral main bronchus or pulmonary vasculature).
- A flexible bronchoscope should also be available for awake intubation and for inspection of the airways post-intubation to confirm tube position.