Mediastinal Masses

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Risk

- Usually a congenital lesion, occurring at 1:5000; no gender bias
- Benign or malignant; cysts or aneurysms that arise from the lung, pleura, or another structure of anterior mediastinum; middle mediastinum: LN enlargement and vascular masses, posterior mediastinum: neurogenic tumors and esophageal abnormalities. In children, neurogenic tumors or cysts are common.
- Lymphoma (Hodgkin or NHL), thymoma, germ cell tumor, granuloma, bronchogenic cancer, thyroid tumors (retrosternal goiter), bronchogenic cysts, and cystic hygroma.

Perioperative Risks

- Periop mortality is rare.
- Sudden CV collapse from inability to ventilate or oxygenate.
- Hypotension or tamponade.
- Increased dyspnea (orthopnea) or cough when supine (increased risk of airway complications).
- Syncopal symptoms or pericardial effusion (increased risk of CV complications).
- Major airway complications in these pts are now more likely to occur in the postanesthetic care area rather than in the OR.

Worry About

- Inability to get on cardiopulmonary bypass rapid enough to avoid permanent neurologic damage
- Superior vena cava syndrome with airway edema and increased bleeding
- Recurrent laryngeal nerve injury
- Pts at risk with cough and pain, dyspnea and dysphagia, superior vena cava syndrome, tracheal deviation, Horner syndrome, cyanosis, mediastinal widening, and hoarseness

Overview

- Severity of symptoms does not predict intraop course.
- Airway obstruction or hemodynamic compromise has occurred with induction of GA, intubation, muscle relaxation, position change, and after extubation.
- Pts may present with Sx that include chest pain or fullness, dyspnea, cough, sweats, superior vena cava obstruction, hoarseness, syncope, or dysphagia.
- Pts can be asymptomatic and have a mass diagnosed on a screening chest radiograph or CT scan.

Etiology

- Adults: 97% malignant, 80% metastatic bronchogenic carcinomas; 17% lymphomas (50% of lymphomas have mediastinal involvement); 20% thymomas (50% malignant, 35% associated with myasthenia gravis).
- Pediatric: 8% malignant, 16–36% NHL, and 54–81% Hodgkin lymphomas, bronchial cysts, and teratomas.
- Superior vena cava syndrome in 6–7% of lung cancer.
- Others include parathyroid or thyroid tumors; lymphoid tumors; teratomas; aortic aneurysms; esophageal achalasia or diverticula, diaphragmatic hernia.

Usual Treatment

- For tissue diagnosis, biopsy under local anesthetic.
- If no tissue can be obtained or pt is uncooperative, approach is selective radiotherapy sparing some tumor for later diagnosis; if not diagnostic, then biopsy under GA.
- Surgical resection for some tumors.
- Anesthesia complications are usually fewer after radiation.

Assessment Points

System	Effect	Assessment by Hx	PE	Test
HEENT	Possible tracheal compression by mass, bulky nodal disease	Dysphonia, dysphagia, coughing paroxysms when supine or orthopnea	Palpable neck mass, wheezing, stridor	Indirect laryngoscopy, CXR, CT scan, MRI, pulm flow volume studies
CV	SVC syndrome, compression of PA, cardiac failure	Dyspnea, fatigue, syncope, peripheral edema, crackles, headache, chest pain, SOB	Facial or neck swelling, upper body edema, cyanosis, increased JVP, hypotension	CXR, ECHO, ECG, stress ECHO, CT/MRI
CNS	Recurrent laryngeal nerve compression, spinal cord compression	Stridor, dysphonia, focal symptoms based on point of compression	Anatomical distortion of neck or thorax	CXR, CT
RESP	Decreased lung volumes, bronchial compression, obstructive pneumonia	SOB, increased respiratory rate, dyspnea, cough	Wheezing, distant breath sounds, hypoxemia, pedal edema	PFTs, ABG, CXR, DL_{CO}

Key References: Blank RS, de Souza DG: Anesthetic management of patients with an anterior mediastinal mass: continuing professional development, *Can J Anaesth* 58(9):853–867, 2011; Fischer GW, Cohen E: An update on anesthesia for thoracoscopic surgery, *Curr Opin Anaesthesiol* 23(1):7–11, 2010.

Perioperative Implications

Preoperative Preparation

- Consider (including pediatric pts) an IV prior to induction (lower extremity if SVC syndrome).
- All pts should have a CXR and a chest and neck CT scan prior to any surgical procedure to plan airway management.
- Those with PA or heart compression may need cardiopulmonary bypass (check availability prior to induction with cannulation sites prepped and draped).
- Studies of flow-volume loops have shown a poor correlation with the degree of clinical airway obstruction and have not demonstrated usefulness in managing these pts.
- Reserve use of premedication except for anticholinergic.

Monitoring

- Consider intra-arterial, central venous, or PA cath.
- If SVC syndrome, insert central venous access or PA cath via femoral vein.

Airway

- Tracheal or distal compression; may become obstructed with induction and muscle relaxation.
- Maintain spontaneous ventilation throughout procedure unless ETT is below obstruction.
- Pts who are symptomatic in supine position are best induced sitting or semi-sitting.
- Awake fiber optic intubation may be skipped if asymptomatic in supine position and CXR and/or CT scan do not reveal airway obstruction or compression.
- If in doubt, consider awake fiber optic bronchoscopy to rule out obstruction or compression.
- If compression seen in thoracic trachea, consider a single lumen armored ETT with its tip distal to the compression.
- If compression is at level of carina or distal, endobronchial intubation or a double-lumen endobronchial tube is recommended.

Preinduction/Induction

- May develop airway obstruction with inability to ventilate.
- May develop hypoxia from obstruction of pulm artery and blood flow to lungs.
- If muscle relaxants are required, assisted ventilation should first be gradually taken over manually to ensure that positive-pressure ventilation is possible and only then can a short-acting muscle relaxant be administered.
- Development of airway or vascular collapse at induction demands immediate awakening.

Maintenance

- Consider local anesthesia; otherwise consider keeping pt breathing spontaneously.
- If obstruction occurs, consider altering pt's position; attempt rigid bronchoscopy, median sternotomy, or femorofemoral cardiopulmonary bypass.

Extubation

- Deep extubation during spontaneous breathing recommended; try to minimize straining, coughing, or bucking which would all increase intrathoracic pressure.
- Observe in a monitored bed for several h after extubation to detect and treat delayed airway obstruction.

Anticipated Problems/Concerns

- Airway obstruction with the inability to ventilate.
- Vascular compression with hypotension, hypoxia, and arrest.
- Consider radiation and/or chemotherapy before surgery.
- If GA required, consider inspection of tracheobronchial tree with fiber optic bronchoscopy.
- If GA required, maintaining spontaneous ventilation preferable.
- The most useful information for the anesthesiologist to guide management of these pts comes from the pt's Hx and the chest imaging.
- Special problems in pediatric populations: Anesthetic deaths have mainly been reported in children, possibly due to the more compressible cartilaginous structure of the airway or because of underestimation of the severity of the airway compression in children due to the difficulty in obtaining a clear Hx of positional symptoms. Even with proper management, children with tracheobronchial compression more than half cannot be safely given GA. Further increasing risk in pediatric pts, securing the distal airway with awake fiber optic intubation and placement of an ETT distal to a tracheal obstruction, an option for some adults with masses compressing the midtrachea, is not an option in most children.

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