

Perioperative Implications

Preoperative Preparation

- Optimal preop preparation, in response to associated anxiety, which can be achieved through both pharmacologic and nonpharmacologic means

Monitoring

- Routine with attention to placement of ECG leads
- IV site and BP cuff on contralateral arm

Airway

- Table arrangements may warrant a secure airway.
- Nasal O₂ or LMA may be appropriate.

Induction

- Thoracic epidurals, intercostal nerve blocks, and local infiltration have successfully been administered as primary anesthetics and adjuvants to GA.

- There is speculation that regional anesthesia and analgesia techniques might help to maintain perioperative immune competence thus modulating the risk of recurrence or metastasis.

Maintenance

- Consideration for the high incidence of postop N/V.
- Incision over operative breast that can also include axilla.
- Dissection can include breast areolar tissue, muscle down to chest wall, and extension into axilla.
- Identification of thoracodorsal and long thoracic nerve often requires stimulation that contraindicates presence of NM blocking agents.
- Surgical field will be in view and allow for monitoring of active blood loss.

- Surgical team leaning on chest can affect ventilatory performance.

Postoperative Considerations

- Pain score: 2–6.
- Pain adequately managed with Toradol, acetaminophen, narcotic PCA, or regional block.
- Communicate with PACU that no venous sticks or BP measurements should be performed on arm of operative side when axillary lymph node dissection is involved.

Anticipated Problems/Concerns

- Anxiety associated with the fear of breast cancer and altered body image can be quite significant.

Cancer, Esophageal

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Risk

- Incidence in USA: 4.39:100,000 in white men, 2.0:100,000 in white women, 8.63/100,000 in African-American men, and 4.2:100,000 in black women.
- Adenocarcinoma more common in white men, while SCC highest in black men.
- Overall mortality rate is 4% (white) to 8% (black).

Perioperative Risks

- Reflux as a risk of aspiration.
- Malnutrition with dehydration due to dysphagia.
- Periop arrhythmias occur in 20–60% of cases.
- Anastomotic leak most frequent surgical complication (9–10%).

Worry About

- Pulm compromise (25%) due to lung injury from preop chemo-/radiation therapy, chronic aspiration, extensive tobacco use, and ventilator-induced lung injury

- Airway protection during induction and postop
- Arrhythmia
- Alcohol withdrawal syndrome
- Hydration status/malnutrition

Overview

- Primarily either SCC from the esophageal squamous epithelium or adenocarcinoma of gastric origin.
- Median age of diagnosis is 67 y, with a long-standing Hx of tobacco and alcohol intake.
- Dysphagia and weight loss are initial symptoms, often present for 3–4 mo.
- Extensive local growth and lymphatic involvement before becoming widely disseminated.

Etiology

- SCC (mainly localized in the upper one-third of the esophagus) is associated with achalasia for >25 y, tobacco use, alcohol, and lack of aspirin and statin use.

- Adenocarcinoma (mainly at GE junction) is associated with GERD, esophagitis (Barrett esophagus), and obesity.
- Nutritional factors (red meat, poor vegetable intake, hot liquids) have been implicated.

Usual Treatment

- Treatment depends on extent of disease and pt's medical status.
- Radioablation or photodynamic therapy is reserved for esophageal dysplasia.
- Surgery with or without chemotherapy the only curative option (open or minimally invasive [MIS]).
- Radiation is reserved for pts with unacceptable surgical risks or advanced disease.
- Palliative placement of internal esophageal stents facilitates swallowing of liquids and secretions.

Assessment Points

System	Effect	Assessment by Hx	PE	Test
CV	Alcohol abuse–induced cardiomyopathy and arrhythmias	DOE Exercise tolerance		ECG ECHO, stress test
RESP	Tobacco abuse Chronic aspiration Radiation/chemotherapy	Pneumonias, RV Htn Cough, DOE Sputum	Wheezing RV heave	CXR PFTs, DLco ABG
GI	Obstruction Reflux Malnutrition	Dyspnea, orthopnea, weight loss	Debilitated	EGD
CNS	Alcohol abuse Delirium tremens	Last EOTH ingestion and amount		
MS	Weakness	Poor nutrition	Muscle wasting	Serum albumin
RENAL	Dehydration	Limited intake		Lytes, Cr, BUN

Key References: Ng JM, Carney A: Anesthesia for esophagectomy, *Anesthesiol Clin* 33:143–163, 2015; Carney A, Dickinson M: Anesthesia for esophagectomy, *Anesthesiology Clin* 33:143–163, 2015.

Perioperative Implications

Preoperative Preparation

- Sedation should be minimized to prevent aspiration in pts at risk.
- Antisialagogue (atropine 0.4 mg or glycopyrrolate 0.2 mg) may be used.

- May premedicate with H₂ blockers for acid aspiration prophylaxis plus metoclopramide to promote gastric emptying.
- Steroids given if recently used.
- Placement of thoracic epidural or paravertebral cath for postop pain control.
- Gabapentinoids to prevent chronic pain.

- Cisplatin-based chemo can lead to CRF.
- Fasting for 6–8 h for solids and 2 h for carbohydrate-rich drinks has been suggested (ERAS) if no dysphagia.

Monitoring

- Monitor arterial line for ABG and BP.
- Employ goal-directed therapy techniques for fluid management.

Airway

- Rapid-sequence induction or awake FOB intubation may be necessary for symptomatic pts.
- Lung isolation DLT, bronchial blocker or a Uni-vent tube properly positioned) may be necessary to accommodate one-lung ventilation.

Induction

- Hypovolemia often results in BP fluctuations.
- Risk of aspiration.

Maintenance

- No one agent or technique is shown to be superior.
- Hypotension can occur due to mediastinal compression, blood loss, and initial dehydration. Maintain “balanced” fluid management. Role of vasoconstrictors is controversial on anastomosis perfusion. Low-dose dexmedetomidine may be beneficial.
- Oxygenation concerns during one-lung ventilation, the use of 100% O₂, prior pulm disease due to tobacco history, and volu-baro-atelectrauma during mechanical ventilation.
- Lung-protection advocated during mechanical ventilation; lower tidal volumes 5–6 mL/kg recommended with/without PEEP, using either volume or pressure modes of ventilation to maintain adequate oxygenation with plateau inspiratory pressures <25 cm H₂O.

- Hypothermia is a concern in long procedures.
- Placement of NG tube with surgical guidance can decompress the stomach (thus decreasing risk of aspiration and dehiscence).

Extubation

- Continuing risk of aspiration.
- Aim for early extubation either in the OR or within a few hours of surgery. This decreases the need for postop sedation with less fluid requirements and requires presence of good regional techniques.
- Use caution with obese and sleep apnea pts.
- If postop ventilation required, the DLT should be changed to a single lumen tube or bronchial blockers removed.
- A tube exchanger (Cook airway exchanger cath) is indicated if reintubation is deemed difficult (possible edema and fluid shifts) or in case of residual muscle paralysis. DLT is withdrawn over the tube exchanger and a single lumen tube is threaded over. Laryngoscope can be used to move soft tissue that may impede placement.

Adjuvants

- Acetaminophen can be used to supplement analgesia. NSAIDs may increase risk for anastomotic leak.

- Postop metoclopramide should be used with caution due to increased motility and possible anastomosis damage.

Postoperative Period

- Epidural/paravertebral analgesia is beneficial for open procedures. Regional techniques (intercostal blocks) should be used to supplement IV narcotics for MIS.
- Increased risk for supraventricular tachycardia and atrial fibrillation (25%). Rate control is recommended by the AHA, initially with IV amiodarone (class 2A) or diltiazem (class 2B) if BP tolerates. Beta-blockers should be continued in the postop period.
- Pneumonia and anastomotic leak are the other two most common complications.

Anticipated Problems/Concerns

- Airway management concerns: Aspiration risk, reintubation, and extubation criteria.
- Volume status in a dehydrated pt undergoing a lengthy surgical procedure with mediastinal compression and a thoracic epidural.
- Arrhythmias in the postop period; use prophylactic amiodarone.

Cancer, Lung Parenchyma

Roger A. Moore

Risk

- Lung cancer is the primary cause of cancer death.
- Asbestos exposure increases risk 5-fold.
- Smoking increases risk 15-fold.
- Radon exposure increases risk 2-fold.

Perioperative Risks

- Associated CAD
- Pulm insufficiency following lung tissue resection

Worry About

- Optimization of preop pulmonary status
- Issues secondary to metastatic spread, such as superior vena caval syndrome
- Myasthenic syndrome (Eaton-Lambert) with oat cell carcinoma
- Massive hemoptysis with cancer invasion of bronchial arteries
- Active pneumonia in pulm parenchyma distal to obstructed bronchioles

- Development of postop ARDS, pneumonia, or respiratory failure in 15–20%; higher in elderly
- Development of cardiac complications in 10–15%; higher in elderly

Overview

- Four primary types of lung cancers: squamous cell, or bronchogenic; adenocarcinoma (most common); large cell carcinoma; and small cell carcinoma.
- 70% of pts with COPD need extra postop pulm care.
- Pts often nutritionally depleted.
- Many pts have alcohol abuse history.
- Preop pulm state may limit option of lobectomy.
- Hormonal imbalances common due to hormone secreting tumors:
 - 3% of pts are Cushingoid.
 - 70% of pts with bronchogenic carcinomas have increased ACTH or pro-ACTH.
 - Up to 60% of pts with lung cancer have inappropriate ADH.

- Myasthenic syndrome occurs owing to decreased release of nerve-ending acetylcholine, leading to increased sensitivity to all muscle relaxants.

Etiology

- Environmental factors important (smoking, asbestos exposure, radon exposure).
- Higher incidence in areas located near oil refineries.

Usual Treatment

- Oat cell cancer frequently treated with radiation and chemotherapy (need good renal function).
- Lobectomy or pneumonectomy are common approaches in other types of lung cancers; DLCO of <60% predicts 75% mortality; >100% predicts 100% survival.
- Lobectomy increasingly performed using VATS, while pneumonectomy still primarily performed with a thoracotomy.

Assessment Points

System	Effect	Assessment by Hx	PE	Test
CV	Myocardial ischemia, arrhythmia, cor pulmonale	Angina SOB Palpitations SOB	S ₃ gallop Irregular pulse Distended neck veins	Exercise stress test ECG Cath ECHO
RESP	Pneumonia, bronchospasm, COPD	Productive cough, wheezing, SOB, dyspnea	Rhonchi-rales, wheezes, decreased BS, clubbing	CXR; PFTs: MBC, MMEFR, DLCO; ABGs
ENDO	SIADH	Lethargy, increased weight, decreased urine Thin skin, poor wound healing Weight gain, striae	Hypometabolic	Lytes Elevated urine sodium (rarely needed)
	Increased ACTH		Cushingoid, increased BP	Cortisone level (rarely needed)
NM	Eaton-Lambert (myasthenic)	Decreased muscle weakness	Decreased muscle strength with exercise	EMG (rarely needed)
NUTRITION	Wasting DTs	Weight loss, alcohol abuse	Cachexia, BMI change, increased liver size	Liver function tests (especially albumin)

Key References: Lohser J, Slinger P: Lung injury after one-lung ventilation: a review of the pathophysiologic mechanisms affecting the ventilated and the collapsed lung, *Anesth Analg* 121: 302–318, 2015; Chappell D, Jacob M, Hofmann-Kiefer K, et al: A rational approach to perioperative fluid management, *Anesthesiology* 109:723–740, 2008.