Mesothelioma

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Risk

- Incidence in USA: Approximately 2000–3000 new cases annually and decreasing. Increasing incidence in developing countries due to poor regulation of asbestos in mining and industrial use
- Attributable mortality: 14 deaths per million in USA
- Male to female ratio: 3–6:1
- 0.16% of all malignancies

Perioperative Risks

- Usually discovered in geriatric male undergoing lung biopsy
- Pleural effusion
- General debilitation from malignancy

Worry About

- Previous needle biopsy of lung and thoracentesis make pneumothorax a concern.

Overview

- Diffuse malignant mesothelioma arises from the mesothelial surface of the pleura, peritoneum, and pericardium and the tunica vaginalis of the testis.
- 80–90% percent originate from the pleura.
- Peak incidence 20–40 y after asbestos exposure.
- Usual onset of symptoms at age 55–70 y.
- Median survival after onset of symptoms is approximately 18 mo.

Etiology

- Diffuse mesothelioma related to asbestos exposure in 12–93% of cases
- Also associated with radiation therapy, erionite exposure, chronic inflammation and fibrosis, and other agents

Usual Treatment

- Treatment has been controversial and largely ineffective.
- Therapy has consisted of combinations of radiation to hemithorax, chemotherapy, and sometimes surgery (parietal pleurectomy and decortication or extrapleural pneumonectomy).

Assessment Points

System	Effect	Assessment by Hx	PE	Test
HEENT	Tracheal displacement Superior vena cava syndrome			Lateral and AP CXR
CV				ECG, ECHO
RESP	Pneumothorax	Cough, chest pain, increased SOB		ABG, PFTs (for lung resections) CXR (post biopsy; in expiration)
	Restrictive lung disease	Dyspnea with exercise	Percussion and auscultation of chest	
GI	Weight loss, debilitation, peritoneal tumors	Past body weights		CT scan of abdomen (not for periop care) Albumin (for degree of malnutrition) CBC (for malnutrition)
ENDO	Not associated with paraneoplastic syndromes			

Key References: Rusch VW: Diagnosis and treatment of pleural mesothelioma, *Semin Surg Oncol* 6(5):279–284, 1990; Ng J, Hartigan PM: Anesthetic management of patients undergoing extrapleural pneumonectomy for mesothelioma, *Curr Opin Anaesthesiol* 21(1):21–27, 2008.

Perioperative Implications

Preoperative Preparation

- Usually come to surgery for lung biopsy via thoracoscopy or open-lung biopsy; some pts are scheduled for pleuropneumonectomy.
- Assess pulmonary status; size of effusion, no pneumothorax.
- Pt often had one or more recent needle biopsies of lung or thoracenteses.
- Review radiographic studies for size and location of tumor.

Monitoring

- Routine monitors
- Resp system via stethoscope, SpO_2, and $PETCO_2$
- Intra-arterial catheter for complex surgical procedures

Airway

- Look for tracheal and mediastinal displacement on radiographic studies.

Induction

- Propensity for hypoxia, particularly from restrictive lung disease.

Maintenance

- High FIO_2 may be necessary.
- One-lung ventilation.
- Lateral positioning.

Extubation

- Ensure pt meets extubation criteria.

Adjuvants

- Pain control after thoracoscopy or thoracotomy
- No special considerations for muscle relaxants, reversal agents, local anesthetics, or special drug interactions

Postoperative Period

- Monitor ventilation and oxygenation.
- Pain relief; consider epidural or spinal analgesia after thoracotomies.
- May have air leak postop.

Anticipated Problems/Concerns

- Anesthesia with one-lung ventilation for a geriatric pt with incurable malignancy.
- Recent lung biopsy and thoracentesis prior to surgery and potential for complications from those procedures, including pneumothorax and dehydration.
- With extrapleural pneumonectomy, a possibility of massive blood loss, dysrhythmias, and hemodynamic instability during pericardial window and patch.
- Effective pain relief and monitoring of resp function postop.
- Consider ICU stay for those undergoing complex procedures.

Methemoglobinemia

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Risk

- Incidence within USA: Rare
- Gender prevalence: None
- Socioeconomic or ethnic prevalence: None

Perioperative Risks

- Inadequate O_2 carriage and delivery to tissues.
- Hemolysis may be induced by methylene blue, especially in pts with G6PD deficiency.

Worry About

- Percent of MetHb. Symptoms vary and depend on the level of MetHb present: Cyanosis appears when MetHb reaches 10–20%. Tachycardia and tachypnea can appear when MetHb reaches 20–50%. CV collapse, coma, and seizures can occur when MetHb reaches 50–70%. Death may occur at MetHb levels >70%

Overview

- MetHb is produced when Hb is oxidized and Fe^{2+} is converted to Fe^{3+} so that Hb cannot bind O_2, and the O_2-Hb dissociation curve is shifted to the left.
- Hereditary forms due to cytochrome b5 reductase deficiency or abnormal hemoglobin M.
- Acquired methemoglobinemia is largely due to oxidizing medications, including local anesthetics (benzocaine, prilocaine), antibiotics (dapsone), and nitrites. Toxic dosages can vary between individuals. Other medications and drugs (e.g., cocaine) have also been known to cause methemoglobinemia.

Etiology

- Endogenous mechanisms (NADH-MetHb reductase and NADPH-MetHb reductase) normally maintain MetHb levels to <1%. Oxidizing agents convert Hb to MetHb and can overwhelm protective mechanisms, resulting in toxic methemoglobinemia.