Benign and Malignant Esophageal Neoplasms, Perforation, Caustic Ingestion

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Benign Neoplasms

- **Epithelial tumors**
  - papilloma, polyp, adenoma, cyst

- **Nonepithelial tumors**
  - fibromyoma, leiomyoma, lipomyoma, fibroma, mesenchymal tumor, neurofibroma, osteochondroma

- **Heterotopic tumors**
  - gastric mucosal tumor, melanoblastic tumor, sebaceous gland tumor, granular cell myoblastoma, pancreatic gland tumor, thyroid nodule
Leiomyoma

• 2/3 of all benign tumors

• Indications for resection: dysphagia, >5cm, increase in size, mucosa ulceration, rule out malignant process

• Approach
  – <8cm: extramucosal enucleation
  – >8cm: esophageal resection
Leiomyoma

Symptoms or abnormal chest x-ray
  Barium swallow
    (filling defect)
  Endoscopy
    (normal mucosa covering mass)
    EUS
      (homogeneous, hypoechoic mass)
      Clinically diagnose leiomyoma
        Surgery
        Radiologic monitoring
  CT
    (hypodense)
Malignant Neoplasms

- Majority of esophageal cancer is squamous cell carcinoma or adenocarcinoma

- Incidence of squamous cell cancer decreasing, while incidence of adenocarcinoma rising

- Now equal incidence of each tumor in the U.S.

- 17% overall 5 year survival rate
Risk Factors

- Squamous cell carcinoma
  - Smoking
  - Alcohol
  - Foods containing N-nitroso compounds
  - Underlying esophageal disease (achalasia, caustic strictures)

- Adenocarcinoma
  - Barrett’s esophagus
  - GERD
  - High BMI
  - Smoking
Epidemiology

### Epidemiology of esophageal cancer in the United States

<table>
<thead>
<tr>
<th></th>
<th>Squamous cell</th>
<th>Adenocarcinoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>New cases per year</td>
<td>6000</td>
<td>6000</td>
</tr>
<tr>
<td>Male-to-female ratio</td>
<td>3:1</td>
<td>7:1</td>
</tr>
<tr>
<td>Black-to-white ratio</td>
<td>6:1</td>
<td>1:4</td>
</tr>
<tr>
<td>Most common locations</td>
<td>Middle esophagus</td>
<td>Distal esophagus</td>
</tr>
<tr>
<td>Major risk factors</td>
<td>Smoking, alcohol</td>
<td>Barrett's esophagus</td>
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</table>
Malignant Transformation

• **Squamous cell carcinoma**
  squamous epithelium -> epithelial dysplasia ->
  carcinoma in situ -> carcinoma

• **Adenocarcinoma**
  squamous epithelium -> intestinal metaplasia to
  columnar epithelium (Barrett’s esophagus) -> low-
  grade dysplasia -> high-grade dysplasia ->
  adenocarcinoma
Clinical Manifestations

- Dysphagia to solids (80%)
- Weight loss (50%)
- Odynophagia (20%)
Staging

• **T**
  T1: Invades lamina propria, muscularis mucosa, or submucosa
  T2: invades muscularis propria
  T3: invades adventitia
  T4: invades adjacent structures

• **N**
  N1: 1-2 regional LNs
  N2: 3-6 regional LNs
  N3: 7+ regional LNs

• **M**
  M1: distant mets
### Squamous Cell Carcinoma Staging

<table>
<thead>
<tr>
<th>Stage</th>
<th>T</th>
<th>N</th>
<th>M</th>
<th>Grade</th>
<th>Tumor location 5</th>
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<td>1, X</td>
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<td>IB</td>
<td>T2-3</td>
<td>N0</td>
<td>M0</td>
<td>2-3</td>
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<td></td>
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<tr>
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<tr>
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# Adenocarcinoma Staging

<table>
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<td>M0</td>
<td>1-2, X</td>
</tr>
<tr>
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<td>N0</td>
<td>M0</td>
<td>3</td>
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<td></td>
<td>T2</td>
<td>N0</td>
<td>M0</td>
<td>1-2, X</td>
</tr>
<tr>
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<td>T2</td>
<td>N0</td>
<td>M0</td>
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<tr>
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<td>T3</td>
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<td>M0</td>
<td>Any</td>
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<tr>
<td></td>
<td>T1-2</td>
<td>N1</td>
<td>M0</td>
<td>Any</td>
</tr>
<tr>
<td>IIIA</td>
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<td>N2</td>
<td>M0</td>
<td>Any</td>
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<tr>
<td></td>
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<td>N1</td>
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<td></td>
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<td>N3</td>
<td>M0</td>
<td>Any</td>
</tr>
<tr>
<td>IV</td>
<td>Any</td>
<td>Any</td>
<td>M1</td>
<td>Any</td>
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</table>
Diagnosis

- Endoscopy and biopsy
- CT chest/abdomen
- PET- to detect mets
- Endoscopic ultrasound- most accurate for locoregional tumor staging
# Treatment

<table>
<thead>
<tr>
<th>Stage</th>
<th>TNM</th>
<th>Treatment</th>
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<td></td>
<td>T3N0M0</td>
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<tr>
<td>IIB</td>
<td>T1N1M0</td>
<td>surgery +/- preop chemorad</td>
</tr>
<tr>
<td></td>
<td>T2N1M0</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>T3N1M0</td>
<td>surgery +/- preop chemorad</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>palliation (chemo, rad, stent)</td>
</tr>
<tr>
<td>IV</td>
<td>M1</td>
<td>palliation (chemo, rad, stent)</td>
</tr>
</tbody>
</table>
Treatment

• Only 30-40% resectable at presentation

• Cervical esophageal cancer usually treated like other SCC of head/neck… chemorad preferred over surgery

• Thoracic esophageal cancer requires total esophagectomy due to risk of submucosal skip lesions
Superficial esophageal cancer

- Esophagectomy

- Endoscopic resection
  - For Tis (high-grade dysplasia) or T1a (invades mucosa but not submucosa)
  - If specimen shows deeper invasion, can then get esophagectomy

- RFA, photodynamic therapy
  - For dysplastic Barrett’s epithelium
  - Disadvantage: no specimen
Transhiatal esophagectomy

- Exposure with upper midline laparotomy and left neck incision
- Thoracic esophagus bluntly dissected through each incision
- Cervical anastomosis created utilizing gastric pull-up
- Disadvantages: inability to perform full thoracic lymphadenectomy, lack of visualization of mid-thoracic dissection
Ivor-Lewis (transthoracic) esophagectomy

• Exposure with laparotomy and right thoracotomy

• Intrathoracic anastomosis

• Advantages: direct visualization of thoracic esophagus, can perform full lymphadenectomy, lower rate of anastomotic leak

• Disadvantages: greater likelihood of bile reflux
Three-hole esophagectomy

- Exposure with right posterolateral thoracotomy, laparotomy, left neck incision

- Advantages: direct visualization of thoracic esophagus, can perform full lymphadenectomy, lower rate of bile reflux
Adjuvant Therapy

- Timing (pre-operative vs post-operatively) and type (chemo vs rad vs chemorad) controversial

- Surgery alone preferred for stage I

- Neoadjuvant chemorad followed by surgery preferred for stages IIB & III if distal esophageal or GE junction cancer

- Patients with completely resected node-positive cancer who haven’t received neoadjuvant therapy should get adjuvant chemo or chemorad
Locally advanced unresectable cancer

- Potentially resectable (T4a)- invasion of pleura, pericardium, diaphragm
- Unresectable (T4b)- invasion of aorta, trachea, heart, great vessels, presence of tracheoesophageal fistula
- Neoadj chemorad may make unresectable disease resectable
Locally advanced unresectable cancer

• Radiation +/- chemo

• Esophageal dilatation +/- stenting

• Photodynamic therapy, laser ablation
Caustic Ingestion

- Ingestion of strong acids or strong bases
- First step is airway protection... may need tracheostomy
- Endoscopy
  - Minor/questionable ingestion: endoscopy after 24-48 hrs
  - Large ingestion: immediate endoscopy to guide treatment
Caustic Ingestion

Caustic ingestion

Severe injury
  ABC’s, upright chest x-ray, abd films
  Perforation No perforation

Esophagoscopy ± bronchoscopy
  Injury grade

Full-thickness IIB/III
  • Antibiotics
  • ± Steroids
  • TPN
  • Close observation for deterioration

Mild Grade I Grade IIA
  Worsening symptoms

Symptoms

Asymptomatic
  <24 hr stay
  Immediate discharge
  Follow-up

h/o exposure

Emergency resection via thorax and/or abdominal approach

48 hr observation NPO, advance diet as tolerated
Caustic Ingestion

SEQUELAE:

• Esophageal stricture
  – 1/3 of patients with caustic injury develop strictures (more likely if higher grade injury)
  – treat with repeat dilations

• Esophageal squamous carcinoma
  – 1000x higher risk compared to general population
  – usually alkali ingestion
  – begin surveillance 15-20 yrs after exposure with endoscopy every 1-3 yrs
Esophageal perforation

**CAUSES:**

- **Instrumental (59%)**
  - Endoscopy
  - Dilation
  - Intubation

- **Noninstrumental**
  - Swallowed foreign body (12%)
  - Penetrating neck/chest/abd trauma (9%)
  - Corrosive injuries
  - Boerhaave's syndrome
Esophageal perforation

CLINICAL FEATURES:

• Cervical: cervical dysphagia, neck pain, dysphonia, subcutaneous cervical emphysema

• Intrathoracic: symptoms of mediastinitis (tachycardia, tachypnea, fever, leukocytosis)

• Intraabdominal: symptoms of acute abdomen (tachycardia, tachypnea, fever, leukocytosis)
Esophageal perforation

**DIAGNOSIS:**

- Contrast esophagram with gastrografin (gold standard)
  - repeat with barium if negative with gastrografin

- Flexible endoscopy
  - to help localize for OR planning
  - contraindicated if suspect mucosal tear -> can cause full-thickness tear

- CT- to localize fluid collections
Esophageal perforation

**MANAGEMENT:**

- Water-Soluble or Barium Contrast Esophagography, Chest X-Ray, Computed Tomography
  - Contained Perforation
    - Broad-Spectrum Antibiotics, Parenteral Nutrition
  - Uncontained Perforation
    - No Improvement <24 hr
      - Cervical
        - Drainage
      - Thoracic
      - Abdominal
    - Evaluation of Perforation
      - Surgical Repair Tolerable
        - Primary Repair
      - Surgical Repair Intolerable
        - Controlled Fistula
        - Exclusion and Diversion
      - Malignancy
        - Resection
Esophageal perforation

MANAGEMENT:

• Upper third: cervical drainage
  – left neck incision, G or J tube for enteral feeding

• Middle third:
  – right 5th intercostal thoracotomy, G or J tube, chest tubes
  – buttressed primary repair w/ flaps of pleura, pericardium, diaphragm, omentum, muscle

• Lower third:
  – left 7th intercostal thoracotomy, G or J tube, chest tubes
  – buttressed primary repair w/ pedicled intercostal muscle flap
References