Rescue for Complications After Esophagectomy
The role of early diagnosis and intervention

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General Thoracic Surgery
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Disclosures

- Ethicon / J&J – education/travel
- Covidien – in-kind donations for education
Outline

• Specific complications
  – anastomotic leak/conduit necrosis
  – chylothorax
  – laryngeal nerve palsy

• Significance of complications
  – Technical or medical
  – Failure to rescue

• Prevention of complications?
In my/our practice, I/we track complications using:

A. Clavien-Dindo or Accordion
B. Other
C. STS GTS DB
D. Our own system
E. STS DB and one of the above
F. None of the above
Operation techniques

• Open
  – Ivor Lewis
  – McKeown
  – Transhiatal
  – Thoracoabdominal

• Minimally invasive
  – VATS/laparoscopic
  – All laparoscopic
  – Robotic
  – Prone/supine
  – Hybrid

• Anastomosis
  – Cervical
  – Thoracic
  – Stapled/Sewn

• Pylorus
  – Drainage
  – No Drainage
  – Botox/dilation

• Duodenum
  – Kocher
  – No Kocher
“Technical” Complications

- Anastomotic
  - Leak: intrathoracic or cervical
  - Stricture
  - Conduit necrosis
- Chylothorax
- Recurrent laryngeal nerve
- Diaphragm hernia
- Gastroparesis
- Postoperative bleeding
  - e.g. transfusion or need for splenectomy (delayed)
Complications

- **Pulmonary**
  - Postoperative ventilator support > 48hrs
- **Cardiovascular**
  - Dysrhythmia
  - Coronary ischemia
- **Hematologic**
- **Infectious (non-pulmonary)**
- **Neurologic/Delirium**
- **Renal**
H/O prior laparoscopic-assisted Ivor Lewis 29 mm EEA esophagogastric anastomosis
Anastomotic leak or conduit necrosis

• **Initial management**
  – Drain and dilate
  – Assess degree of mediastinal contamination

• **Operative intervention**
  – Endoscopy
  – Anastomotic dilation
  – Esophageal stent / suture
  – Empyema drainage
  – Conduit takedown/esophagostomy
H/O transhiatal esophagectomy, semi-stapled CEGA
Conduit fistula

• Initial management
  – Drainage
  – Assess degree of mediastinal contamination

• Operative intervention
  – Endoscopy
  – Anastomotic dilation
  – Esophageal stent / endoscopic suture
  – Conduit takedown/esophagostomy
Esophageal stent

- Stent failure (persistent leak or need for operative repair other than migration)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Stent</th>
<th>Stent Failure</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal/cervical location</td>
<td>11</td>
<td>4</td>
<td>0.02</td>
</tr>
<tr>
<td>Gastroesophageal junction location</td>
<td>18</td>
<td>5</td>
<td>0.03</td>
</tr>
<tr>
<td>Injury &gt; 6 cm</td>
<td>7</td>
<td>3</td>
<td>0.04</td>
</tr>
<tr>
<td>Conduit leak</td>
<td>6</td>
<td>3</td>
<td>0.03</td>
</tr>
<tr>
<td>Associated malignancy</td>
<td>14</td>
<td>0</td>
<td>0.6</td>
</tr>
</tbody>
</table>

n=172  n=15

- Ensure adequate nutrition, critical care and appropriate infection surveillance

Chylothorax

• **Diagnosis**
  – Awareness
  – Cream/oil challenge
  – Pleural fluid analysis

• **Initial management**
  – Drainage
  – Dietary fat restriction
  – Parenteral nutrition

• **Operative Ligation**

• **Pleurodesis**

• **Embolization**
Thoracic duct embolization
Recurrent laryngeal nerve

- Unilateral vocal cord palsy
  - 2x more common after cervical approach
  - Hoarseness
  - Aspiration
- Thyroplasty
Recurrent laryngeal nerve

- Unilateral vocal cord palsy
  - 2x more common after cervical approach
  - Hoarseness
  - Aspiration

- Evaluation
  - Voice
  - Swallowing
  - Airway

- Management
  - Thyroplasty
  - Injection medialization
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time to Vocal Cord Injection (mean, range)</strong></td>
<td>4.5 days (1-8)</td>
</tr>
<tr>
<td><strong>Vocal Cord Injection Volume (mean, range)</strong></td>
<td>1.1 mL (0.6-1.6)</td>
</tr>
<tr>
<td><strong>Vocal Cord Injection Time (mean, range)</strong></td>
<td>21 min (8-64)</td>
</tr>
<tr>
<td><strong>Total OR Time (mean, range)</strong></td>
<td>67 min (42-108)</td>
</tr>
<tr>
<td><strong>ENT-related post-operative complications</strong></td>
<td>1 (5%)</td>
</tr>
<tr>
<td><strong>New Post-Injection Pneumonia</strong></td>
<td>0 (0%)</td>
</tr>
<tr>
<td><strong>Diet Recommendation Pre-Injection</strong></td>
<td></td>
</tr>
<tr>
<td>NPO</td>
<td>18 (90%)</td>
</tr>
<tr>
<td>Clear Liquid</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>Unknown</td>
<td>1 (5%)</td>
</tr>
<tr>
<td><strong>Diet Recommendation Post-Injection</strong></td>
<td></td>
</tr>
<tr>
<td>Regular</td>
<td>12 (60%)</td>
</tr>
<tr>
<td>Other Oral (i.e post-esophagectomy)</td>
<td>7 (35%)</td>
</tr>
<tr>
<td>NPO</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>Nerve status</td>
<td>N (% of subtotal)</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Nerve Transected (n=5, 25%)</td>
<td></td>
</tr>
<tr>
<td>Additional Procedures</td>
<td>2 (40%)</td>
</tr>
<tr>
<td>No Dysphonia or Dysphagia</td>
<td>1 (20%)</td>
</tr>
<tr>
<td>Lost to Follow-Up with Otolaryngology</td>
<td>2 (40%)</td>
</tr>
<tr>
<td>Nerve Status Unknown (n=15, 75%)</td>
<td></td>
</tr>
<tr>
<td>Additional Procedures</td>
<td>3 (20%)</td>
</tr>
<tr>
<td>No Dysphonia or Dysphagia</td>
<td>10 (67%)</td>
</tr>
<tr>
<td>Lost to Follow-Up with Otolaryngology</td>
<td>2 (13%)</td>
</tr>
</tbody>
</table>
Survival impact of complications

Rizk NP et al. JACS 2004;198:42 - 50
Survival impact of complications

Technical complications - NS

Concurrent med/surg – p<0.001
Operative volume and survival

Ghaferi, Birkmeyer and Dimick. *Medical Care* 2011;49:1076-1081
Operative volume and complications

Ghaferi, Birkmeyer and Dimick. *Medical Care* 2011;49:1076-1081
Failure To Rescue

Death after at least one perioperative complication

Ghaferi, Birkmeyer and Dimick. *Medical Care* 2011;49:1076-1081
Failure To Rescue

Death after at least one perioperative complication

• Early recognition
• Escalation of care

Medicare (AHRQ) quality indicator

http://www.qualityindicators.ahrq.gov

VTE, pneumonia, sepsis, shock/MI, bleeding

• National: 118.52/1000 patient discharges

Wakeam E et al. JAMA Surg 2015;150:65-73
Failure To Rescue
Patterns of complication

Failure To Rescue
Patterns of complication

Failure To Rescue

- **Factors associated with FTR**
  - **Hospital**
    - Operative volume ↓
    - Greater level of nurse staffing ↓
    - Teaching status ↓
  - **Patient**
    - Medical complications ↑
    - SSI, DVT, pneumonia, sepsis ↑
    - Age > 70, non-white ethnicity ↑

Failure To Rescue

- Strategies to escalate care?
  - Structural components
    - Improve/modify existing systems
    - Resource-intense, slow to implement
  - Processes of care
    - Some evidence, mostly expert opinion
    - Prone to user fatigue, reversion to previous practice and habits
  - Organizational safety (culture and climate)

Ghaferi AA and Dimick JB. *Ann Surg* 2015;261:839-840
Failure To Rescue

- Factors that limit escalation of care
  - Identify deterioration
    - Clinical inexperience
    - Hierarchical barriers
    - High workload
  - Communicating with senior colleague
  - Responding to deterioration
    - Medical Emergency or Rapid Response Teams

Multidisciplinary Care Pathways

Profs. Ken Fearon, Olle Lungqvist, Henrik Kehlet (Edinburgh UK)

Thomas Varghese, MD (Seattle WA)
Michael Englesbe, MD (Ann Arbor MI)
Multidisciplinary Care Pathways

• **Enhanced Recovery After Surgery (ERAS)**
  – Multi-modal surgical care

• **STRONG for Surgery**
  – Nutritional assessment, smoking cessation, medication review, and blood sugar control

• **Michigan Surgical Health & Optimization Program (MSSHOP) clinic**
  – Moderate exercise, incentive spirometry, immunomodulatory diet, relaxation techniques

Courtesy of Phil W. Carrott, MD, and Jules Lin, MD (Ann Arbor MI)
Summary

• Complications following esophagectomy occur frequently

• Complications following esophagectomy have adverse impact on both perioperative and also long-term survival

• “Failure to rescue” patients from complications following esophagectomy is a significant contributor to worse perioperative survival

• Strategies to improve rescue after complications are simple in concept but possibly difficult to implement
Thank you

Section of Thoracic Surgery (UMHS)

Philip Carrott  Jules Lin  William Lynch  Mark Orringer  Rishindra Reddy