Esophageal Stent Placement for Perforation, Fistula and Anastomotic Leak

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No disclosures but...
Q54. Esophageal stent placement for an acute esophageal perforation:

a. Is an appropriate initial therapy for all patients
b. Is effective treatment as an isolated procedure in the majority of patients
c. Is associated with a relative high rate of success and low rate of mortality in select patients
d. Has not been found to be beneficial unless an initial operative repair has failed.
Goals of Therapy for Esophageal Perforation

- Resuscitation/supportive care
- Directed antimicrobial therapy
- Occlusion of the perforation
- Elimination of infection in the mediastinum, pleural spaces, neck and/or abdomen
- Preservation of foregut continuity
- Delivery of nutrition (enteral preferred)
# Traditional Therapy

## Perforation

- **Non-operative therapy**
  - Narrow inclusion criteria

- **Operative repair**
  - “Failure” rate 39%*
    *Force et al; Ann Thorac Surg, 2010*
  - May increase if repair is ≥ 24 hrs

- **Esophageal diversion**
  - 50% never undergo reconstruction
    - Morbidity ~ 70%
    - Mortality ~ 20%

- **Esophagectomy**
  - Mortality 4-13%

## Anastomotic Leak

- **Non-operative therapy**
  - 30% eventually require surgery*
    *Crestanello et al; JTCVS, 2005*

- **Reoperative therapy**
  - “Failure” rate ~ 25%

- **Esophageal diversion**
  - 50% never undergo reconstruction
    - Morbidity ~ 70%
    - Mortality ~ 20%
Intraoperative Esophageal Perforation

- 14 year old male
- “Uneventful” laparoscopic Nissen fundoplication
- Postoperative esophageal leak
  - delayed diagnosis
- Two attempted repairs
  - Primary repair beneath fundoplication

Presented at the Society of Thoracic Surgeons’ 42nd Annual Meeting, 2006
Clinical Course

- Transferred to our facility with multi-system organ failure
  - Pulmonary
  - Renal
  - Gastrointestinal

- Bacteremia

- Continued esophageal fistula

- Intra-abdominal compartment syndrome
Operative Course

- Endoluminal esophageal stent
- VATS decortication
- Abdominal “silo” for compartment syndrome
- Renal Failure resolved
- Weaned from ventilator
- Tolerated enteral feeding
- Esophagram→resolved leak
Follow-up

- Stent removed endoscopically on day 20

- Transferred to pediatric rehabilitation tolerating a regular diet

- Has required no subsequent surgery
Esophageal Stenting - Historic

- Esophageal intubation for malignant obstruction
- Symonds (1887) – ivory & silver prostheses
- Celestin (1959) – pull through tubes/laparotomy
- Atkinson and Ferguson (1977) – placed with endoscopy
- Self-expanding metallic stents (1990’s)
  - Gianturco
  - Ultraflex
  - Wallstent
Current Esophageal Stents

- Ultraflex
- Polyflex
- Alimax
- Wallflex
Future research will focus on delivery of diagnostic and therapeutic modalities through natural orifices...
Ideal treatment for an esophageal perforation or fistula:

- Fulfill traditional goals of operative therapy
  - Closure of the perforation
  - Drainage of the mediastinum and pleural space(s)
  - Establish enteral nutrition
  - Maintain foregut continuity
- Avoid thoracotomy/celiotomy and primary repair
Esophageal Stent Placement

- Confirm and localize the perforation or fistula by esophagram.
- CT scan of chest/abdomen.
- Identify need for other procedures.

CT scan image of the chest and abdomen with annotations.
Esophageal Stent Placement

- Performed in the operating room
  - General anesthesia
  - Associated procedures

- Fluoroscopy

- Endoscopy, stent placement and any associated procedures performed by a thoracic surgeon
Esophageal stent placement

- Using the esophagram as a guide, identify the target area at esophagoscopy
- Assess the possibility of using a stent
- Place a PEG before attempting stent placement
Polyflex Esophageal Stent

- Silicone coated polyester
- Non-permeable
- Can be repositioned
- Substantial radial force / lower frequency of migration
- Does not “fracture”
- Easily removed
Endoscopic stent placement
Endoscopy After Stent Placement
Post-Stent Treatment

- Care for the patient as if they had required operative repair
  - ICU environment
  - Volume resuscitation
  - Directed antibiotic therapy
  - Respiratory support if needed

- NPO

- PPI’s

- Gastric drainage

- Nutrition (preferably enteral)
Post-Stent Treatment

- Esophagram 48 hrs after placement (or when the patient can participate) to confirm occlusion
- Oral intake initiated (“soft mechanical” diet)
- Discharge when drain(s) are removed
- Remove stent at 2-4 weeks
  - OR/general anesthesia
  - EGD
Tracheo-Esophageal Fistula
## Esophageal Fistulae

<table>
<thead>
<tr>
<th>N</th>
<th>21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>58 ± 20 (range 14-93)</td>
</tr>
<tr>
<td><strong>Attempted repairs (at least one)</strong></td>
<td>1.4 ± 1 (range 1-4)</td>
</tr>
<tr>
<td>Associated procedures</td>
<td>20 (95%) (excluding PEG)</td>
</tr>
<tr>
<td>Occlusion</td>
<td>20 (95%)</td>
</tr>
<tr>
<td>Length of Stay</td>
<td>12 ± 14 (median 8)*</td>
</tr>
<tr>
<td>Migration</td>
<td>5 (24%)</td>
</tr>
<tr>
<td>Mortality</td>
<td>1 (5%)</td>
</tr>
</tbody>
</table>

*Postoperative Esophageal Leak Management with the Polyflex Esophageal Stent*

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Richard K. Freeman, MD*, Anthony J. Ascioti, MD, Thomas C. Wozniak, MD

*J Thorac Cardiovasc Surg 2007;133:333-338*
### Iatrogenic Esophageal Perforation

<table>
<thead>
<tr>
<th>N</th>
<th>17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean yrs)</td>
<td>54 ± 20 (range 17-91)</td>
</tr>
<tr>
<td>Perforation to stent (mean hrs)</td>
<td>39 ± 39 (range 3-121)</td>
</tr>
<tr>
<td>Associated procedures</td>
<td>8 (47%) (excluding PEG)</td>
</tr>
<tr>
<td>Leak occlusion</td>
<td>16 (94%)</td>
</tr>
<tr>
<td>Length of stay</td>
<td>8 ± 9 (median 5)</td>
</tr>
<tr>
<td>Stent Migration</td>
<td>3 (17%)</td>
</tr>
<tr>
<td>Mortality</td>
<td>0</td>
</tr>
</tbody>
</table>

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**Esophageal Stent Placement for the Treatment of Iatrogenic Intrathoracic Esophageal Perforation**

Richard K. Freeman, MD, Jaclyn M. Van Woerkom, RN, BSN, and Anthony J. Ascioti, MD

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### Spontaneous Esophageal Perforations

<table>
<thead>
<tr>
<th>N</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>48 ± 18 (range 26-67)</td>
</tr>
<tr>
<td>Perforation to stent</td>
<td>22 ± 33 (range 6-78)</td>
</tr>
<tr>
<td>Associated procedures</td>
<td>9 (47%) (excluding PEG)</td>
</tr>
<tr>
<td>Leak occlusion</td>
<td>17 (89%)</td>
</tr>
<tr>
<td>Length of stay</td>
<td>9 ± 12</td>
</tr>
<tr>
<td>Migration</td>
<td>4 (21%)</td>
</tr>
<tr>
<td>Mortality</td>
<td>0</td>
</tr>
</tbody>
</table>

*Esophageal Stent Placement for the Treatment of Spontaneous Esophageal Perforations*

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## Spontaneous Esophageal Perforations

<table>
<thead>
<tr>
<th>Condition</th>
<th>Count (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associated alcohol ingestion</td>
<td>9 (46%)</td>
</tr>
<tr>
<td>Obesity (BMI &gt; 30)</td>
<td>7 (37%)</td>
</tr>
<tr>
<td>Mediastinitis at diagnosis</td>
<td>13 (68%)</td>
</tr>
<tr>
<td>Sepsis at diagnosis</td>
<td>3 (16%)</td>
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</table>
Stent Placement for Intrathoracic Leak After Esophagectomy

<table>
<thead>
<tr>
<th>Condition</th>
<th>N</th>
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</thead>
<tbody>
<tr>
<td>Patients receiving a stent</td>
<td>187</td>
</tr>
<tr>
<td>Successful</td>
<td>172</td>
</tr>
<tr>
<td>Anastomotic leak</td>
<td>31</td>
</tr>
<tr>
<td>Chronic fistula</td>
<td>38</td>
</tr>
<tr>
<td>Perforation</td>
<td>103</td>
</tr>
<tr>
<td>Spontaneous</td>
<td>42</td>
</tr>
<tr>
<td>Iatrogenic</td>
<td>61</td>
</tr>
<tr>
<td><strong>Associated malignancy</strong></td>
<td><strong>14</strong></td>
</tr>
<tr>
<td>Failed</td>
<td>15 (8%)</td>
</tr>
<tr>
<td>Anastomotic leak</td>
<td>2</td>
</tr>
<tr>
<td>Chronic fistula</td>
<td>3</td>
</tr>
<tr>
<td>Perforation</td>
<td>9</td>
</tr>
<tr>
<td>Spontaneous</td>
<td>4</td>
</tr>
<tr>
<td>Iatrogenic</td>
<td>6</td>
</tr>
</tbody>
</table>

Suspected Esophageal Perforation

History and physical examination
CT neck/chest/abdomen
Esophagram (Gastrografin and/or Barium)

No esophageal Perforation → Further evaluation

Proximal Primary operative repair and drainage → Failure of repair

Cervical esophageal perforation → Distal

Intrathoracic esophageal perforation (< 6 cm in length)

Intrathoracic esophageal perforation (> 6 cm in length) → Transthoracic repair → Failure of repair

Intra abdominal esophageal and/or gastric perforation → Transabdominal repair & jejunostomy
Case Presentation

- 86 year old female presents to the ED with four hours of chest pain after an EGD
  - FEV$_1$ 0.8 liters (38%)
  - EGD → Mass in the mid esophagus – “likely malignant”
  - Severe kyphosis
Case Presentation

- Polyflex stent placed
- Repeat esophagram 40 hours later
- Clear liquids initiated
- Home on hospital day 5
- Underwent chemo/radiation as definitive therapy
- Stent removed 79 days after placement
Following Chemo/Radiation Therapy

Before

After
Conclusions

- Esophageal perforation or fistula can be effectively treated in the majority of patients using an occlusive esophageal stent as part of a hybrid operative approach
  - Rapid sealing of leak
  - Early oral nutrition & hydration
  - Alternative to reoperative repair / esophageal diversion / esophagectomy
  - Appears to reduce hospital length of stay
Conclusions

- Esophageal stent placement for a postoperative intra-thoracic leak following esophagogastrostomy
  - Safe and effective
  - Avoids reoperation in the majority of patients
  - Possible with most types of anastomoses
  - Results in earlier oral nutrition
  - May decrease hospital stay