Introduction

• Perforation of the oesophagus although rare presents one of the most vexing management problems in Surgery
• Associated with a very high morbidity and mortality which
• Worse with delay of diagnosis and appropriate treatment\textsuperscript{1,2}
Reasons for Iatrogenic Oesophageal Perforation

- Oesophageal Dilatation both benign and malignant strictures
- Diagnostic upper GI endoscopy esp rigid
- Transoesophageal echocardiograph
- Oesophageal varices treatment
- Other
  - aortic stent implantation
  - osteosynthesis of cervical spine
  - Endoscopic procedures e.g. mucosectomy

Adapted from Vallbohmer et al 2010, Schmidt 2010
**Diagnosis of Iatrogenic Oesophageal Perforation**

- Thoracic oesophagus poses the most diagnostic challenges.
- High index of suspicion when oesophagoscopy or intervention procedure is not progressing easily.
- Early diagnostic investigation should be instituted before any symptoms or signs:
  - endoscopy
  - radiocontrast study
    - plan radiograph may show extraneous gas
    - barium swallow gives better results!
  - Contrast CT scan if diagnosis delayed will show
    - mediastinitis
    - Pus/fluid collections
Table 2  Clinical presentation of patients with esophageal perforation

<table>
<thead>
<tr>
<th>Symptom</th>
<th>n  (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dysphagia</td>
<td>50 (80.6)</td>
</tr>
<tr>
<td>Thoracic pain</td>
<td>35 (56.5)</td>
</tr>
<tr>
<td>Nausea/regurgitation</td>
<td>31 (50)</td>
</tr>
<tr>
<td>Fever</td>
<td>24 (38.7)</td>
</tr>
<tr>
<td>Mediastinitis</td>
<td>12 (19.4)</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>11 (17.7)</td>
</tr>
<tr>
<td>Subcutaneous emphysema</td>
<td>8 (12.9)</td>
</tr>
<tr>
<td>Pneumothorax</td>
<td>8 (12.9)</td>
</tr>
<tr>
<td>Mediastinal emphysema</td>
<td>4 (6.5)</td>
</tr>
</tbody>
</table>

Schmidt 2010

Note main symptom dysphagia and odynophagia
Approach to Management of Oesophageal Perforation

- Resuscitation
- Infection source Control
- Closure of perforation
- Nutritional support including enteral access
- Main problems arise from thoracic oesophageal perforations
Resuscitation in Perforated Oesophagus

• Late presentation may present in shock
• Resuscitation of chronically dehydrated patients should be cautious
  – they develop pulmonary oedema.
  – use urine output rather than blood pressure to guide fluid requirement.
• Although these patients usually have low albumin, use of albumin as part of resuscitation fluid is not profitable.
**Infection Source Control**

- Use of broad spectrum antibiotics
  - parenteral
  - oral antibiotic suspension in addition is controversial
- drain free pleural perforation and mediastinal fluid/pus
  - tube thoracostomy
  - “pigtail” drain under CT guide
- Cervical diversion oesophagostomy in special cases.
Closure of Perforation$^{1,2,3,4}$

- Operative strategies
  - Thoracotomy repair advocated in early diagnosis but carries significant morbidity and mortality
  - Thoracoscopic repair is alternate technique
  - Endoscopic clip repair (new)
  - Endoscopic suture repair (experimental)
  - T-tube placement
  - Damage control stapling above and below perforation with cervical oesophagostomy or active NGT suction
Stent Perforation Occlusion 3, 6

• Traditional plastic stent, e.g. Proctor-Livingstone and Celestine need general anaesthetic (GA)
  ➢ occlusion or tamponade often incomplete
  ➢ Difficult to remove and need GA
• New covered self-expanding stents placed under conscious sedations
  ➢ Covered self-expanding stents can be metal or plastic
  ➢ major problem is stent migration
  ➢ readily removable
  ➢ Good results, oral feeding can start early
Endoscopic Vacuum Therapy

- New strategy of Vacuum Assisted Care has been described
  - Intraluminally placed polyurethane sponge placement
  - Intracavity placed polyurethane sponge
- Large majority healed without recourse to surgery and with very few complications!
Aggressive Non-Operative Treatment

• Active and aggressive non-operative treatment showed lower morbidity and mortality.

• Drainage of all fluid collections
  - Tube thoracostomy
  - CT guided “pig-tail” placement in mediastinum or costophrenic grooves
### TABLE 2. Treatment of Esophageal Perforations

<table>
<thead>
<tr>
<th>Discharge</th>
<th>No.</th>
<th>Mortality</th>
<th>Healing At</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical esophagus</td>
<td>10</td>
<td>—</td>
<td>9/10</td>
</tr>
<tr>
<td>Primary repair</td>
<td>3</td>
<td>—</td>
<td>Fistula</td>
</tr>
<tr>
<td>Abscess drainage</td>
<td>3</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Nonoperative</td>
<td>4</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Thoracic esophagus</td>
<td>34*</td>
<td>2</td>
<td>31/32</td>
</tr>
<tr>
<td>Primary repair</td>
<td>2</td>
<td>(1)</td>
<td></td>
</tr>
<tr>
<td>Surgical drainage</td>
<td>4</td>
<td>(1)</td>
<td></td>
</tr>
<tr>
<td>Nonoperative</td>
<td>28</td>
<td>—</td>
<td>Fistula into empyema tube (subsequently healed)</td>
</tr>
</tbody>
</table>

*Excluding 3 dissecting aneurysm patients.

(Vogel 2005)

Note: No mortality for non-operative
Table 1 Esophageal perforation severity score

<table>
<thead>
<tr>
<th>Variable</th>
<th>Score (range 1–3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt;75 years</td>
<td>1</td>
</tr>
<tr>
<td>Tachycardia &gt;100 beats/min</td>
<td>1</td>
</tr>
<tr>
<td>Leukocytosis &gt;10 000 WBC/ml</td>
<td>1</td>
</tr>
<tr>
<td>Pleural effusion (on CXR or CT)</td>
<td>1</td>
</tr>
<tr>
<td>Fever &gt;38.5°C</td>
<td>2</td>
</tr>
<tr>
<td>Noncontained leak (on CT or barium swallow)</td>
<td>2</td>
</tr>
<tr>
<td>Respiratory compromise (respiratory rate &gt;30, mechanical ventilation)</td>
<td>2</td>
</tr>
<tr>
<td>Time to diagnosis &gt;24 h</td>
<td>2</td>
</tr>
<tr>
<td>Cancer</td>
<td>3</td>
</tr>
<tr>
<td>Hypotension</td>
<td>3</td>
</tr>
<tr>
<td>Total potential score</td>
<td>18</td>
</tr>
</tbody>
</table>

CT, computed tomography; CXR, chest x-ray; WBC, white blood cell. Data from [6*].

(Sepesi 2010)
Table 2 Outcomes of patients with esophageal perforation based on a perforation score (0–18)

<table>
<thead>
<tr>
<th>Clinical score</th>
<th>≤2 (n=44)</th>
<th>3–5 (n=49)</th>
<th>&gt;5 (n=26)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complication rate (%)</td>
<td>53</td>
<td>65</td>
<td>81</td>
</tr>
<tr>
<td>Mortality (%)</td>
<td>2</td>
<td>6</td>
<td>27</td>
</tr>
<tr>
<td>Length of stay (days)</td>
<td>10</td>
<td>16</td>
<td>28</td>
</tr>
</tbody>
</table>

Data from [6*].

(Sepesi 2010)

Note the higher the score, the higher the complications and mortality
Summary

- Iatrogenic perforation rare but dread complication of upper GI diagnostic and interventional endoscopy

- Challenges with diagnosis for oesophagus thoracic
  - Late intervention
  - High mortality
  - Demands high level of vigilance

- Malignant perforations managed with endoluminal stents

- Benign perforations
  - Aggressive non-operative management
  - Drainage of fluid or pus collections
  - VAC drainage new strategy
  - Diversion oesophagostomy in special cases especially long or multiple caustic strictures
  - primary debridement and repair eschewed

- Nutritional support paramount preferably enteral

- New oesophageal perforation score helps with prognosis

- Single key predictor of good outcome is early diagnosis and intervention.
References


THANK YOU
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