Case Presentation:

44-year-old male presents to the ER with a 5-hour history of retrosternal chest pain and recent onset shortness of breath. He was out drinking the previous night and has been profusely vomiting since 5am.

Differential Diagnosis:

A variety of conditions may present in this fashion:

- GERD/Gastritis/Esophagitis/Gastric ulcer
- Pneumothorax
- Aortic dissection
- Acute pancreatitis
- ACS/MI
- Cannabis hyperemesis syndrome
- Esophageal rupture

History and Physical

Upon arrival to the ER, he is hemodynamically unstable: tachycardic (125), hypotensive (90/58) and febrile (38.2 C). His O₂ sats are 86% on RA. He has no history of gastroesophageal reflux or other relevant medical conditions. He does not use cannabis.
On examination, his abdomen is soft, he is tender in the left upper quadrant and diffusely across his chest wall. Breath sounds are decreased on the left. In addition, he has bilateral supraclavicular crepitus on palpation and a positive Hamman’s crunch (mediastinal crackling, synchronous with the heartbeat) on auscultation. His neck is becoming increasingly distended, and you have noticed a change in phonation since his arrival.

Etiology

Boerhaaves syndrome is most commonly caused by profuse vomiting but can also be the result of anything that increases esophageal pressure such as weightlifting, seizures, abdominal trauma, locally invasive cancers/infections, childbirth, or compressed air injuries.7

Pathophysiology

- Esophageal perforations are classified into 3 groups:
  - Cervical esophagus: can present with neck tenderness, dysphagia, or dysphonia
  - Thoracic esophagus: presents with severe back pain, pleuritic, chest or epigastric pain, inability to lie supine. Most common area for perforation.
  - Intra-abdominal esophagus: Peritonitis

- Severity of perforation tends to depend on the location of rupture, with intrathoracic esophageal ruptures leading to more devastating outcomes.
  - Intrathoracic rupture results in contamination of the thoracic cavity with gastric contents, which can lead to chemical mediastinitis, infection and mediastinal necrosis.6
  - Barogenic rupture of the cervical esophagus has a more benign course, as the spread of contamination to the mediastinum is slow and attachments of the esophagus to the prevertebral fascia limit the lateral dissemination of esophageal flora.6
A Case of Boerhaave Syndrome

Jillian Allan  
Medical Student  
Class of 2024

**Mallory Weiss Syndrome**
- Is characterized by the presence of longitudinal superficial mucosal lacerations within the esophagus, primarily at the GE junction, that results in hematemesis⁵.
- One of the most common causes of acute upper gastrointestinal bleeding⁶.
- Patients with Mallory Weiss tears can present in the same manner as Boerhaaves; however, hematemesis is typically the major clinical manifestation.

**Boerhaaves Syndrome**
- Is the spontaneous rupture of the esophagus following a sudden increase in intraesophageal pressure with negative intrathoracic pressure such as with profuse vomiting or straining⁷.
- It is distinct from Mallory Weiss tears, as it is a full thickness rupture involving all layers of the esophagus.
- Boerhaaves is a life-threatening condition that must be diagnosed and treated urgently, as delayed recognition is likely to result in mortality and morbidity⁴.
- A classic clinical sign of Boerhaaves disease is Mackler’s triad- vomiting, chest pain, subcutaneous emphysema.

### Evaluation
- Diagnosis is established through a computed tomography (CT) scan of the chest or contrast enhanced esophagram. Contrast should be water soluble (gastrografin) to avoid mediastinal contamination with barium contrast.
  - **CT:** Findings suggestive of esophageal rupture include esophageal wall edema and thickening, peri-esophageal fluid, mediastinal widening, and free air/fluid within the pleural spaces, retroperitoneum, or lesser sac.⁶
  - **Radiography:** Plain films may also demonstrate air in the soft tissues of the prevertebral space. Other indications can include pleural effusion, hydropneumothorax, mediastinal widening or subdiaphragmatic air.⁶ While thoracic and cervical radiography can aid in diagnosis, they cannot exclude or confirm esophageal rupture and should not routinely be performed to diagnose this condition. However, a plain radiograph may be performed, and mediastinal air found incidentally when the diagnosis had not been suspected.
  - **Esophagram:** Reveals the location and extent of perforation of the esophagus by the extravasation of the contrast medium.⁶
- Endoscopy should be performed with caution due to the risk of further esophageal damage.
Case Continued

Laboratory results showed elevated leucocytes at $12.9 \times 10^9/L$ (normal 4.5-11.5) and an elevated C-reactive protein level but were otherwise unremarkable.

An erect chest radiograph and urgent CT was done, which showed the “V” sign of Naclerio, a V shaped collection of air along the mediastinum and diaphragm, indicating pneumomediastinum (Fig. 1a). An urgent contrast CT confirmed the radiograph findings, showing pneumomediastinum and left hydropneumothorax (Fig. 1b).

Figure 1. Boerhaave syndrome in a 44-year-old man. (A) Chest radiograph showing Naclerio’s V sign, demonstrating air outlining the mediastinal borders (arrows), indicating pneumomediastinum. (B) Chest CT showing pneumomediastinum and left hydropneumothorax.

Esophageal perforation was confirmed with a contrast esophagram, which showed leakage from the lower esophageal sphincter into the left pleural space.
Figure 2. Contrast esophagram showing esophageal rupture at lower esophageal sphincter with leakage into the left pleural space.¹

Treatment and Management

- Mainstay of treatment includes volume resuscitation, broad-spectrum antibiotic coverage, and surgical evaluation.
- 3 treatments options: conservative, endoscopic, or surgical
  - **Conservative**: typically reserved for small or contained ruptures.
  - **Endoscopic**: stent placement to prevent fistula formations or seal esophageal leaks.
  - **Surgical**: primary esophageal repair via open thoracotomy vs VATS (video-assisted thoracoscopic surgery) with fundic reinforcement- which is the gold standard of treatment if within 24 hours.⁷

Case Conclusion

The patient underwent an emergency VATS procedure which revealed a small tear in the lower esophagus, which was successfully repaired with sutures and a pleural patch. The patient made an uneventful recovery and was discharged on postoperative day 6.
# A Case of Boerhaave Syndrome

**Jillian Allan**  
Medical Student  
Class of 2024

## Summary of Key Points

<table>
<thead>
<tr>
<th></th>
<th>Mallory Weiss Syndrome</th>
<th>Boerhaaves Syndrome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mucosal Tear</strong></td>
<td>Forceful retching</td>
<td>Forceful retching</td>
</tr>
<tr>
<td></td>
<td><strong>Mucosal</strong> tear</td>
<td><strong>Transmural</strong> tear</td>
</tr>
<tr>
<td></td>
<td>Submucosal venous or arterial plexus bleeding</td>
<td>Spillage of esophageal air/fluid into surrounding tissues</td>
</tr>
<tr>
<td><strong>Hematemesis</strong></td>
<td>(bright red or coffee ground)</td>
<td><strong>Retrosternal chest pain</strong></td>
</tr>
<tr>
<td><strong>Odynophagia</strong></td>
<td></td>
<td>- Severe, acute onset</td>
</tr>
<tr>
<td><strong>Epigastric/back pain</strong></td>
<td></td>
<td>- Radiates to L Shoulder</td>
</tr>
<tr>
<td><strong>Rarely hypovolemia</strong></td>
<td></td>
<td><strong>Subcutaneous emphysema</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Hamman’s crunch</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Profuse emesis</strong></td>
</tr>
<tr>
<td><strong>Odynophagia</strong></td>
<td></td>
<td>Odysplasia</td>
</tr>
<tr>
<td><strong>Dyspnea</strong></td>
<td></td>
<td>Fever, sepsis</td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td>Gastroesophageal Junction</td>
<td>Distal esophagus</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Left posterolateral aspect</td>
</tr>
<tr>
<td><strong>Diagnosis</strong></td>
<td>Gastrografin esophagogram</td>
<td>Chest x-ray: pneumothorax, pneumomediastinum, pleural effusion</td>
</tr>
<tr>
<td></td>
<td>- No leakage</td>
<td>Gastrografin esophagogram</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Leakage</td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
<td>Supportive</td>
<td>Emergent Surgical Consultation</td>
</tr>
<tr>
<td></td>
<td>Acid suppression</td>
<td>- VATS</td>
</tr>
<tr>
<td></td>
<td>Cauterization if necessary</td>
<td>Open thoracotomy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acid suppression, Abx, NPO</td>
</tr>
<tr>
<td><strong>Complications</strong></td>
<td>Rare</td>
<td>Acute mediastinitis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pneumomediastinum</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pleural Effusion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sepsis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARDS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Empyema</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Death</td>
</tr>
</tbody>
</table>
References