CASE 3- Toy & Liu CASE FILES: Surgery

A 43-year-old man presents to the emergency room with severe abdominal pain and substernal chest pain. The patient’s symptoms began approximately 12 hours earlier after he returned from a party where he consumed a large amount of alcohol that made him ill. Subsequently, he vomited several times and then went to sleep. A short time thereafter, he was awakened with severe pain in the upper abdomen and substernal area. His past medical history is unremarkable, and he is currently taking no medications. On physical examination, the patient appears uncomfortable and anxious. His temperature is 38.8°C (101.8°F), pulse rate 120/min, blood pressure 126/80, and respiratory rate 32/min. The findings from an examination of his head and neck are unremarkable. The lungs are clear bilaterally with decreased breath sounds on the left side. The cardiac examination reveals tachycardia and no murmurs, rubs, or gallops. The abdomen is tender to palpation in the epigastric region, with involuntary guarding. The results of a rectal examination are normal. Laboratory studies reveal that his white blood count is 26,000/mm³ and that his hemoglobin, hematocrit, and electrolyte levels are normal. The serum amylase, bilirubin, AST, ALT, and alkaline phosphatase values are within normal limits. A 12-lead electrocardiogram shows sinus tachycardia. His chest radiograph reveals moderate left pleural effusion, a left pneumothorax, and pneumomediastinum.

◆ What is the most likely diagnosis?

◆ What is your next step?
ANSWERS TO CASE 3: Esophageal Perforation

Summary: A 43-year-old man presents with a spontaneous thoracic esophageal perforation (Boerhaave syndrome). The patient has a left pneumothorax and exhibits a septic process from the mediastinitis.

◆ Most likely diagnosis: A spontaneous esophageal rupture (Boerhaave syndrome).

◆ Next step: Management of the airway, breathing, and circulation (ABC’s), including the placement of a left chest tube, fluid resuscitation, and the administration of broad-spectrum antibiotics, followed by a water-soluble contrast study of the esophagus.

Analysis

Objectives

1. Recognize the clinical settings, early signs and symptoms, and complications of esophageal perforation.
2. Understand the diagnostic and therapeutic approach to a suspected esophageal perforation.

Considerations

This patient’s clinical presentation is classic for a spontaneous esophageal perforation; however, delay in diagnosis and treatment can still occur because many physicians do not have extensive experience in the evaluation and treatment of this problem. Maintaining a high index of suspicion and pursuing an early diagnosis and early treatment are essential.
APPROACH TO SUSPECTED ESOPHAGEAL PERFORATION

Esophageal perforation remains a surgical emergency. A delay in diagnosis leads to increased morbidity and mortality; therefore, a high index of suspicion should be maintained. Most esophageal perforations are iatrogenic and occur during a diagnostic or therapeutic procedure. Spontaneous esophageal perforation, also referred to as Boerhaave syndrome, accounts for about 15% of all causes of esophageal perforation.

The development of an acute onset of chest pain after an episode of vomiting is typical of Boerhaave syndrome. Other symptoms that may be present include shoulder pain, dyspnea, and midepigastic pain. Findings from a physical examination, screening radiographs, and laboratory results depend on (1) the integrity of the mediastinum, (2) the location of the perforation, (3) and the time elapsed since the perforation. Seventy-five percent of patients present with a pleural effusion indicating disruption of the mediastinal pleura. Contamination of the mediastinum with esophageal luminal contents often leads to mediastinitis and chest pain. A delay in treatment leads to sepsis with signs of systemic infection (tachycardia, fever, and leukocytosis). Perforation into the mediastinum leads to pneumomediastinum that can be seen on a chest radiograph and subcutaneous emphysema that can be demonstrated by physical examination. Because most spontaneous esophageal ruptures occur in the distal third of the esophagus above the gastroesophageal junction, two-thirds of patients present with a left pleural effusion. The time from perforation to the time of diagnosis is of paramount importance to the ultimate outcome (see Table 3–1).

Diagnosis

The best initial diagnostic test for an esophageal rupture is a water-soluble contrast esophagogram, which identifies perforation in 90% of cases. Water-soluble contrast is preferred during the initial examination because it causes less mediastinal irritation than barium if a large leak is discovered. If no leak is encountered with the water-soluble
medium, a barium contrast must be utilized to be assured that no leak is present. After the diagnosis is confirmed and the initial treatment measures have been performed (ie, ABC’s, resuscitation, a tube thoracostomy, and the administration of intravenous antibiotics), the patient is prepared for surgical intervention. The treatment principles for spontaneous esophageal perforation include surgical drainage, debridement, repair, and diversion (Figure 3–1).

<table>
<thead>
<tr>
<th>SIGN OR SYMPTOM</th>
<th>TIME OF OCCURRENCE</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest pain</td>
<td>Immediate, persistent</td>
<td>Most common presenting symptom; less specific are shoulder and abdominal pain.</td>
</tr>
<tr>
<td>Subcutaneous emphysema</td>
<td>1 h after perforation</td>
<td>Occurs more frequently with iatrogenic cervical perforation; may not be present with lower esophageal perforation.</td>
</tr>
<tr>
<td>Pleural effusion on chest radiograph</td>
<td>May be immediate or late (&gt;6 h)</td>
<td>Occurs in 75% of cases; most often on left side (66%) but may occur on right side (20%).</td>
</tr>
<tr>
<td>Fever, leukocytosis</td>
<td>&gt;4 h</td>
<td>Sepsis from mediastinitis.</td>
</tr>
<tr>
<td>Death</td>
<td>Diagnosis made &lt;24 h, 15% Diagnosis made &gt;24 h, &gt;40%</td>
<td>Outcome is dependent on early diagnosis and treatment.</td>
</tr>
</tbody>
</table>
ABC’s, IV fluids, IV Antibiotics Tube thoracostomy

General anesthesia Right posterolateral Chest thoracotomy

>24 hours

Exposure of tear Debridement of tear Reparable?

<24 hours

Exposure of tear Debridement of tear Primary suture repair Reinforce repair* Drainage of area

Drainage Proximal control†, Gastrostomy, jejunostomy via laparotomy

Restudy with esophagogram in 1 wk for presence of leak

*Reinforce with flap (eg, intercostal, pleural).
†Proximal control refers to diversion (eg, nasogastric tube drainage, cervical stoma).

Figure 3–1. An algorithm for managing esophageal perforation. ABC’s, airway, breathing, circulation; IV, intravenous.
Comprehension Questions

[3.1] Which of the following is the most common cause of esophageal perforation?

A. Trauma  
B. Iatrogenic (endoscopy)  
C. Spontaneous rupture (Boerhaave syndrome)  
D. Caustic injury

[3.2] Which of the following is the most sensitive diagnostic examination for diagnosing esophageal perforation?

A. A barium esophagogram  
B. A Gastrografin esophagogram  
C. Esophagoscopy  
D. Computed tomography

[3.3] Which of the following is the most important factor that determines the outcome in esophageal perforation?

A. The size of the perforation  
B. Whether a meal has been ingested recently  
C. The duration between the event and the corrective surgery  
D. Leukocytosis

[3.4] After eating some stale pizza, a 21-year-old college student presents to the emergency room with a 24 hour history of nausea, vomiting, and severe chest pain. A esophageal perforation is diagnosed by a contrast study, with the best clinical impression of its onset occurring about 12 hours previously. Which of the following is the best treatment?

A. Primary surgical repair  
B. Endoscopic repair  
C. Gastrostomy tube and observation  
D. Continued observation for spontaneous healing
Answers

[3.1] **B.** Diagnostic endoscopy is associated with the risk of cervical esophageal perforation, and therapeutic endoscopy (pneumatic dilatation) is most commonly associated with perforation at the gastroesophageal junction.

[3.2] **A.** 90% of the time, a Gastrografin (water-soluble) esophagogram is accurate in identifying a perforation, but a barium study remains the most sensitive method.

[3.3] **C.** The outcome for an esophageal perforation is directly related to the amount of time that elapses between the diagnosis and the treatment.

[3.4] **A.** Primary esophageal repair is generally performed when the perforation is less than 24 hours in duration. In patients in good physiologic condition, surgical repair is generally employed regardless of the duration of perforation.

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**CLINICAL PEARLS**

- Spontaneous esophageal perforation should be suspected in a patient with chest pain after vomiting, subcutaneous emphysema found on physical examination, and left-sided effusion demonstrated on a chest radiograph.
- A high index of suspicion is needed because a delay in diagnosis often leads to a worse outcome.
- Most spontaneous esophageal ruptures occur in the distal third of the esophagus.
- Most iatrogenic esophageal perforations are associated with endoscopy.
REFERENCES

