

Diagnostic Imaging Review

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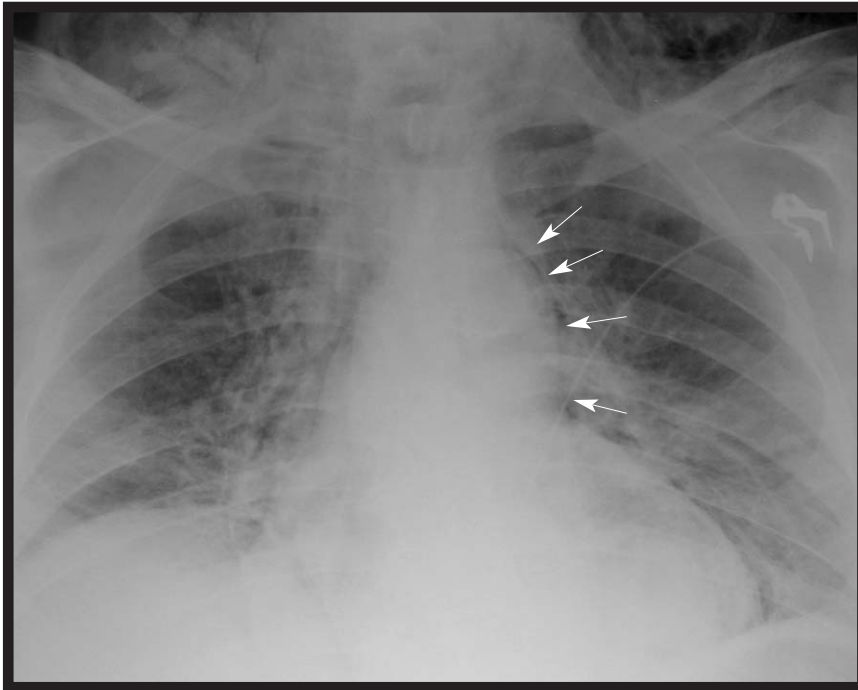


FIGURE 1: Subcutaneous emphysema at the base of the neck and dissecting along the pectoralis muscles

A man with an unusual sequela of alcoholism

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CASE

A 55-year-old male presented to the emergency department with history of vomiting. He appeared acutely ill and complained of experiencing excruciating lower left chest pain. He had a history of coronary artery disease and was an alcoholic. He had undergone prior surgical procedures that included cholecystectomy and coronary artery bypass graft surgery.

The ECG demonstrated tachycardia but no signs of acute MI. His pulse was 120 beats per minute; BP was

130/70 mm Hg; and his respiratory rate was 28 breaths per minute. The patient appeared diaphoretic. Physical examination findings included epigastric tenderness and abdominal rigidity. No peristalsis was noted. Crepitus was felt at the base of his neck. Crackles were heard on chest auscultation.

Chest radiography and esophagography with diatrizoate meglumine and diatrizoate sodium (Gastrografin) to look for esophageal perforation were performed (see the Figures). **What do these images reveal?**

DISCUSSION

Figure 1 is a radiograph demonstrating subcutaneous emphysema at the base of the neck and dissecting along the pectoralis muscles. A pneumomediastinum is also visible. Given the patient's history of vomiting, Boerhaave's syndrome (spontaneous rupture of the esophagus) is suspected. **Figure 2** (page 60) shows contrast visible within the esophagus and stomach, as well as leakage of contrast into the left side of the chest, and confirms esophageal perforation.

BOERHAAVE'S SYNDROME is a name given to a transmural tear of the esophagus secondary to retching or vomiting. The tear is believed to occur as a result of rapidly increased intraluminal pressure within the esophagus against a closed cricopharynx. The intraluminal pressure can also be increased and cause a tear in situations other than retching and vomiting. Such instances include straining, weight lifting, severe coughing, blunt trauma, seizures, and childbirth. The esophageal tear is usually located in the lower third of the esophagus along the posterolateral wall, 2 to 3 cm above the gastroesophageal junction.

Boerhaave's syndrome is often associated with alcoholism, overdose, and bulimia. It is seen more often in males than in females and usually occurs in persons aged 40 to 70 years. It differs from a Mallory-Weiss tear of the esophagus in that a Mallory-Weiss tear is not full-thickness. And unlike a Mallory-Weiss tear, Boerhaave's syndrome is not usually accompanied by hematemesis.

Boerhaave's syndrome is rare overall, but the mortality rate is high if it is misdiagnosed or goes undiagnosed. The most common misdiagnosis is perforated peptic ulcer, and the second most common is MI—which is not unexpected given how Boerhaave's syndrome manifests itself. When diagnosis occurs within 24 hours of occurrence and surgery is performed, the survival rate is

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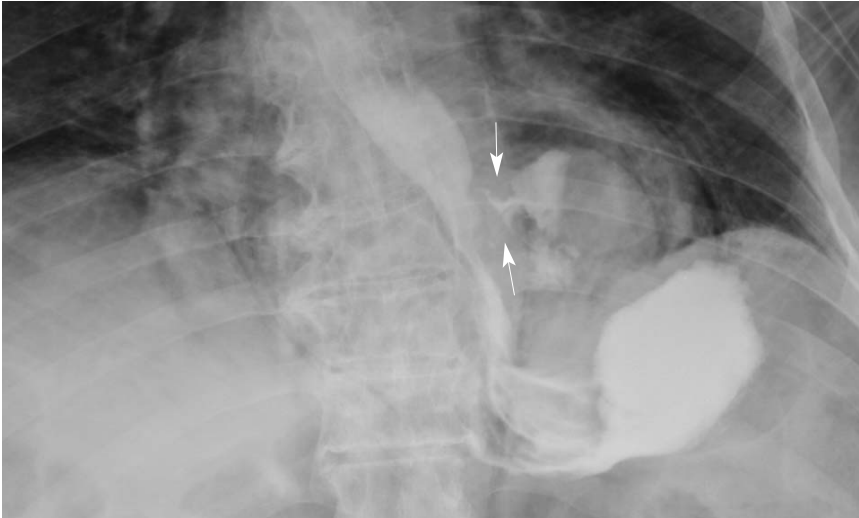


FIGURE 2: Contrast within the esophagus and stomach and leaking into the left side of the chest as seen on esophagography

approximately 70% to 75%. If diagnosis and treatment are delayed for 24 to 48 hours, however, the survival rate drops to 30% to 50%. After 48 hours, survival decreases to approximately 10%. Nearly 100% of patients with Boerhaave's syndrome will die within 7 days if no treatment is provided, usually because of subsequent infection. The complications from a perforated esophagus include mediastinitis, shock, sepsis, empyema, pericarditis, and pneumonitis.

Upon presentation, the patient may complain of a sudden pain in the lower chest or upper abdomen. The pain may radiate to the back or shoulder. Swallowing usually aggravates the pain. The patient may be diaphoretic, hypotensive, and short of breath. Typically, the history includes recent vomiting followed by the sudden onset of pain. Fever may or may not be present. Crepitus may be palpable in the neck or suprasternal notch region. Mackler's triad may be present and includes the presence of subcutaneous emphysema, lower thoracic pain, and vomiting. With auscultation of the chest, a crackling sound may be heard with each heartbeat. This is known as Hamman's crunch, representing the presence of a pneumomediastinum,

and it can sometimes be mistaken for a pericardial friction rub.

Laboratory studies are not usually helpful. There may be leukocytosis and a left shift. Depending on the duration and location of the tear, pleural effusion may be noted, typically on the left. Thoracentesis may demonstrate food particles and gastric secretions within the fluid. The pH of the fluid will be less than 6, and amylase levels will be elevated. Squamous cells from saliva may also be present.

CHEST RADIOGRAPHS can be extremely helpful, particularly with the appropriate clinical scenario. A chest radiograph will be abnormal in approximately 90% of patients with Boerhaave's syndrome, but the findings are usually not specific and a high clinical index of suspicion is needed. The radiograph may demonstrate pleural effusion, pneumothorax, mediastinal widening, pneumomediastinum, or hydropneumothorax. The V sign of Naclerio may be present. This is seen as retrocardiac streaks of air forming a V shape, representing free air in the left lower mediastinum dissecting under the left diaphragmatic pleura.

ESOPHAGOGRAPHY can be used to confirm perforation of the esophagus. A Gastrografin esophagram is positive

in approximately 75% of patients with suspected esophageal tear. Gastrografin is a water-soluble contrast agent. The radiologist watches with fluoroscopy as the patient swallows the contrast to see if the contrast leaks into the pleural space or mediastinum, indicating that a tear is present. Although barium is better seen radiographically, it is generally not used when a perforation of the GI tract is suspected, as it is thought to increase morbidity and mortality if it leaks. If no leak is demonstrated using Gastrografin, some clinicians will then order a barium study for confirmation.

Not all patients will be stable enough to undergo esophagography, and CT may be utilized in these cases. CT of the chest may demonstrate a pleural effusion, periesophageal streaks of air, pneumomediastinum, pneumothorax, or drainable fluid collections. Again, the findings are nonspecific, and a high clinical suspicion of esophageal perforation is needed.

ENDOSCOPY is not routinely used to diagnose a tear of the esophagus. It is considered a risky procedure in an acutely ill patient, and it may increase the size and extent of the perforation. Sometimes endoscopy is used during esophageal stent placement in selected patients. Occasionally it is used when the esophagram is negative but the clinical index of suspicion remains high.

TREATMENT may depend on different factors including extent of the perforation, the overall health of the patient, and the amount of time lapsed between onset of symptoms and diagnosis. The patient routinely requires IV volume resuscitation, broad-spectrum antibiotics, and prompt surgical repair of the tear. If the patient is in poor health or diagnosis is significantly delayed, conservative management may include antibiotics, fluid resuscitation, parenteral hyperalimentation, NPO status, and drainage of the pleural cavity with a thoracostomy tube. Surgery is the mainstay of treatment, however, and should be performed in every case if at all possible, and as soon as possible. [JAAPA](#)