Esophageal rupture: Computed tomography with endoscopic correlation

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Boerhaave syndrome, or spontaneous rupture of the esophagus, is a complication of violent vomiting. Although the syndrome is rare, awareness of it is important because delayed or missed diagnosis can be fatal. Radiographic imaging, particularly computed tomography, is the mainstay of diagnosis, and endoscopy generally does not play a role. We present a case of Boerhaave syndrome diagnosed by computed tomography that was complemented by endoscopic direct visualization to optimize surgical management. True Boerhaave syndrome is extremely rare, and rarer still is an endoscopic view of a known full-thickness tear of the esophagus.

Case report

A 77-year-old man presented with acute left-sided chest pain radiating to his back, and right-upper-quadrant abdominal pain. The pain developed after a bout of violent, nonbloody vomiting related to something he had eaten. The patient had no other complaints. On physical examination, the patient was tachycardic, hypertensive, and afebrile but diaphoretic. There was no evidence of subcutaneous emphysema. His abdomen was nondistended and nontender to palpation. The only abnormality revealed by a battery of laboratory tests obtained in the Emergency Department was an elevated white-blood-cell count [26 x 10^9/L (normal range, 4.2-10.2 x 10^9/L)] with a predominance of neutrophils [87.5% (normal range, 42-75%)].

Portable chest radiography revealed a mild, left-lower-lobe consolidation (Fig. 1). This finding did not completely explain the patient’s discomfort, however, so computed tomography (CT) of the chest and abdomen with oral and intravenous contrast was obtained. This study showed a normal aorta but distension of the thoracic esophagus with residual contrast material, indicating possible partial obstruction (Fig. 2). At the esophagogastric junction there was extravasation of contrast into an adjacent complex collection of fluid and air, which drained into the left pleural
space, consistent with distal esophageal perforation (Figs. 2A-C).

Consultation with a thoracic surgeon raised the possibility of an obstructing distal esophageal mass based on imaging; upper endoscopy assisted in surgical planning. The presence of a mass might have raised the need for an esophagectomy, whereas a tear might have been managed with a repair. Esophagoscopy (click video link below) with minimal air insufflation revealed a dilated proximal esophagus and mucosal irritation, and a 3cm, full-thickness, linear tear in the left distal esophagus, opening into the left thorax, without evidence of obstruction.

Video 1. Esophagoscopy video demonstrates a large, full-thickness tear (arrows) involving the left lateral distal esophagus.

Following esophagoscopy, the thoracic surgeon performed video-assisted thoracoscopic evacuation of a left-sided empyema and partial decortication of the left lung.

The patient recovered over three days and returned home in stable condition.

Discussion

Boerhaave syndrome (BS), or transmural esophageal perforation as a result of vigorous vomiting, was first described by Hermann Boerhaave, a physician and anatomist, in 1724, after witnessing this condition in Baron Jan von Wassenaer, a Dutch admiral who died after self-induced vomiting following over-indulgence at a feast (1). An autopsy revealed a full-thickness tear involving the distal esophagus; the connecting pleural space emitted the odor of the roast duck he had just eaten.

In BS, rupture of the esophagus results from a sudden increase in intraesophageal pressure and negative intrathoracic pressure, secondary to straining or vomiting, in combination with incomplete cricopharyngeal relaxation. It is thought that a Mallory-Weiss tear, a linear tear confined to the distal esophageal mucosa, may be a precursor to BS. In most cases of BS, a transmural tear occurs at the left posterolateral aspect of the distal esophagus and extends for several centimeters (2). The predilection for this particular part of the esophagus may be due to the existence of an anatomic weakness at this point. One study looking at six fresh human cadavers found that insufflating the esophagus caused a rupture at the margin of contact between two differently oriented muscle fibers meeting at the esophagogastric junction on the left posterolateral side of the distal esophagus (3).

BS has a high morbidity and mortality, and is usually fatal in the absence of definitive therapy. Because of the nonspecific nature of the symptoms, combined with its rarity, it is often confused with other more prevalent conditions such as myocardial infarction, pulmonary embolus, or perforated peptic ulcer, thus delaying diagnosis (4). Early diagnosis followed by prompt treatment results in better outcomes (5).

Since clinical features may often be atypical and nonspecific, BS is best diagnosed by radiographic imaging. A CT scan should be performed early in the course of the workup when an esophageal rupture is suspected (6). CT abnormalities include extraluminal air, periesophageal fluid, esophageal thickening and extraluminal contrast, and should alert the physician to the possibility of BS (7).

Due to the need for air insufflation, endoscopy generally does not have a role in the diagnosis of a full-thickness esophageal tear. In our patient, esophagoscopy was performed because an obstructing mass was suspected and, if confirmed endoscopically, would have altered the operative approach.
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