



Catastrophic right-sided *Candida* empyema from spontaneous esophageal perforation

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ABSTRACT

Right-sided empyema secondary to esophageal rupture are rare but reported in the medical literature. We describe an atypical CASE of right-sided empyema with *Candida Tropicalis*, *Candida Glabrata*, and *Staphylococcus lugdenensis* leading to a diagnosis of spontaneous esophageal rupture. We concluded that pleural effusion with fungal and multi-organism growth should immediately raise suspicion for underlying missed esophageal perforation. Prompt diagnosis of esophageal perforation can prevent fatal complications like pleuritis, pneumothorax, hydrothorax, pneumomediastinum, mediastinitis, acute respiratory distress syndrome, and septic shock.

1. Introduction

Spontaneous esophageal rupture has an established anatomical predilection for the left-sided esophageal wall (>90%) and is often associated with left-sided thoracic cavity involvement, including pleural effusion, hydropneumothorax, and empyema. We present a CASE of right-sided hydropneumothorax growing *Candida Tropicalis*, *Candida Glabrata*, *Staphylococcus lugdenensis*, and *Stenotrophomonas maltophilia* stemming from underlying silent esophageal rupture.

2. CASE report

A 64-year-old male with a past medical history of hypertension, arthritis, seizure disorder, Parkinson's disease, hiatal hernia, and chronic anemia was brought to the emergency department by his wife for acutely progressive lethargy. The patient had been experiencing non-bloody and non-bilious vomiting for the past three months with decreased oral intake. Since last month, he also developed progressive generalized weakness and new-onset dyspnea, which worsened to the point of not getting out of bed the day before the presentation. The patient was a nonsmoker and had no prior history of alcohol or any illicit drug abuse; however, he was recently reported taking excessive NSAIDs for joint pains. He was being followed by the hematology and

gastroenterology team for chronic anemia. Endoscopy and colonoscopy performed three years ago (2017) had revealed gastritis, severe diverticulosis, 1 cm tubular adenoma of the splenic flexure, and hemorrhoids.

In the emergency department, the patient's vitals were unstable with blood pressure of 65/30 mmHg, heart rate of 84 bpm, and saturating 96% on 4L oxygen. The patient was afebrile but ill-appearing on physical exam with labored breathing, tachypneic (20–22 breaths per minute), and was noted to have decreased breath sounds on the right side of his lung. The patient also had mild elevations in ALT/AST with normal bilirubin levels. The initial laboratory results are presented in Table 1. The chest x-ray revealed a right-sided pneumothorax with >1 cm air gap and a moderate right-sided pleural effusion (Fig. 1-A). Blood gas analysis on arrival showed metabolic acidosis with respiratory compensation and a high anion gap (venous blood gas: pH 7.23, pCO₂ 31 mmHg, HCO₃ 13 mmol/L, sodium 137 mEq/L, Chloride 107 mEq/L, albumin 2.3 g/dL, albumin corrected anion gap: 21.3 mEq/L, albumin corrected delta ratio: 0.8).

Emergent computed tomographic (C.T.) study of the abdomen and pelvis showed known sigmoid and descending colon diverticulosis and no evidence of any retroperitoneal hematoma or occult gastrointestinal bleeding. CT chest revealed air and fluid predominantly in right pleural cavity (Fig. 2).

The patient underwent volume resuscitation with fluids and packed

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Table 1
Blood work on admission.

LABS	RESULTS (S.I. Units)
White cell count	25.5 k/uL
Neutrophils	22.6 k/uL
RBC	1.58 k/uL
Hemoglobin	2.3 g/dL
Hematocrit	10.9%
Platelets	652 u/L
PT/INR	2.3
APTT	26 seconds
Lactate	13 ng/mL
Troponin	0.04 ng/mL
Sodium	141 mEq/L
Potassium	5.2 mEq/L
Chloride	107 mmol/L
HCO3	13 mmol/L
Anion gap	21
Glucose	114 mg/dL
Calcium	7.4 mg/dL
Creatinine	2.0 mg/dL
eGFR	34 mL/min
BUN	24 mg/dL
Protein	4.6 g/dL
Albumin	2.3 g/dL
Lactate Dehydrogenase	774 units/L

red blood cells and was transferred to intensive care for further management. Blood, sputum, and urine cultures were obtained. Cefepime and were started for coverage of pneumonia with parapneumonic effusion. A chest tube was placed with immediate drainage of approximately 1 L of air and purulent fluid (Table 2). The respiratory status continued to decline, and the patient was intubated.

The pleural fluid cytology was negative for malignant cells, but the culture revealed fungal organisms consistent with *Candida Tropicalis*, *Candida Glabrata*, and *Stenotrophomonas maltophilia*. The blood and urine cultures were negative. We broadened antibiotic coverage to meropenem and caspofungin. This polymicrobial flora in empyema fluid and elevated amylase (>10,000 u/L) was suggestive of an esophageal tear.

Upper endoscopy revealed a 5–10 mm defect in the posterior distal esophagus resulting in the diagnosis of Boerhaave syndrome. Gastric ulcers were also seen (Fig. 3). Tissue fibrosis and friability limited the approximation of defect edges. Esophageal stenting was done, and biopsies were obtained, which were negative for malignant cells but displayed acute inflammation with fungal organisms consistent with candida species. An echocardiogram showed an ejection fraction of 61% with moderate to severe tricuspid regurgitation, mitral regurgitation, and moderate pulmonary hypertension.

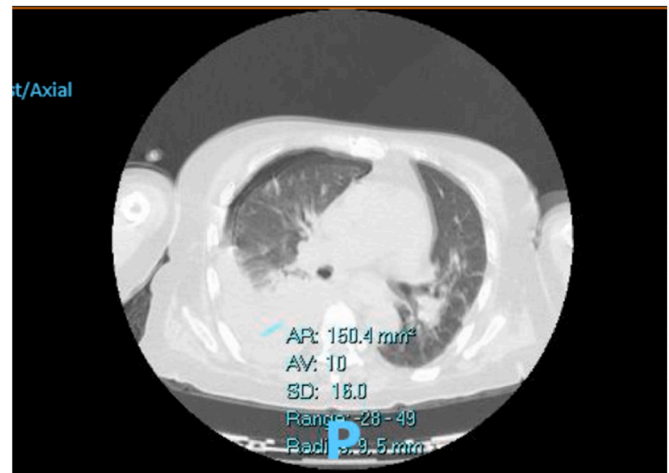


Fig. 2. C.T. scan chest showing air and fluid in pleural cavity.

Table 2
Pleural fluid analysis.

LABS	RESULTS
Color	Straw
Nucleated Cell Count	11,133/mm ³
RBC	93,000/mm ³
Appearance	Cloudy
pH	5.6
Lymphocytes	2%
Monocyte/Macrophage Count	7%
Segmented Neutrophils	91%
Adenosine Deaminase	7.3
Lactate Dehydrogenase	14,898
Protein	3.1 g/dL
Glucose	<2 mg/dL
Protein	2.5 g/dL
Albumin	0.8 g/dL

The patient initially improved clinically and was successfully extubated on day 8 of hospitalization. A CT-guided catheter (pigtail) was placed in the right-sided pleural cavity and was draining well, but within the next 24 hours, the patient started to decompensate again (Fig. 4). Final cultures also grew *Lactobacillus* and *Staphylococcus lugdunensis*, sensitive to ceftazidime, trimethoprim/sulfamethoxazole, and levofloxacin. We changed the antibiotic regimen to vancomycin, ceftazidime, metronidazole, and caspofungin. The chest x-ray showed

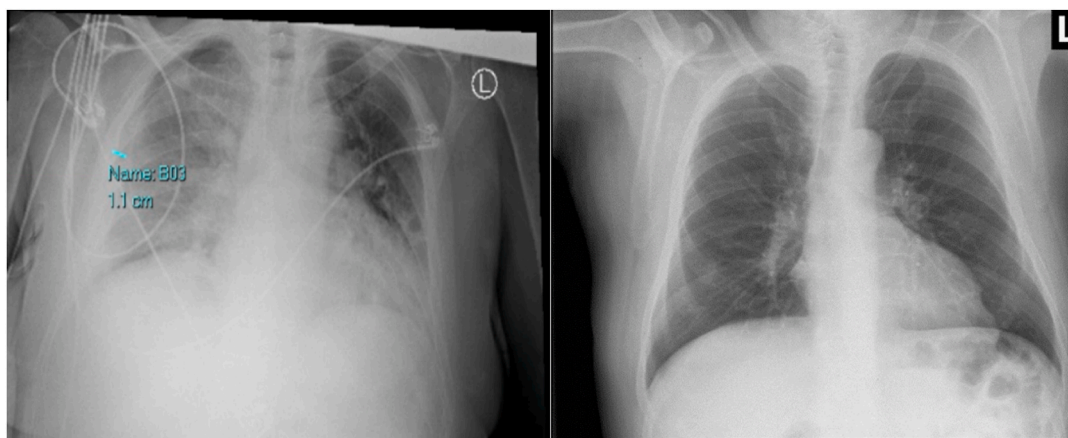


Fig. 1. (A & B)- A- A right-sided pneumothorax, moderate right-sided pleural effusion, and compressive atelectasis of right lower lobe can be visualized. B-Patient’s prior normal chest x-ray from a few months ago was obtained from medical records.

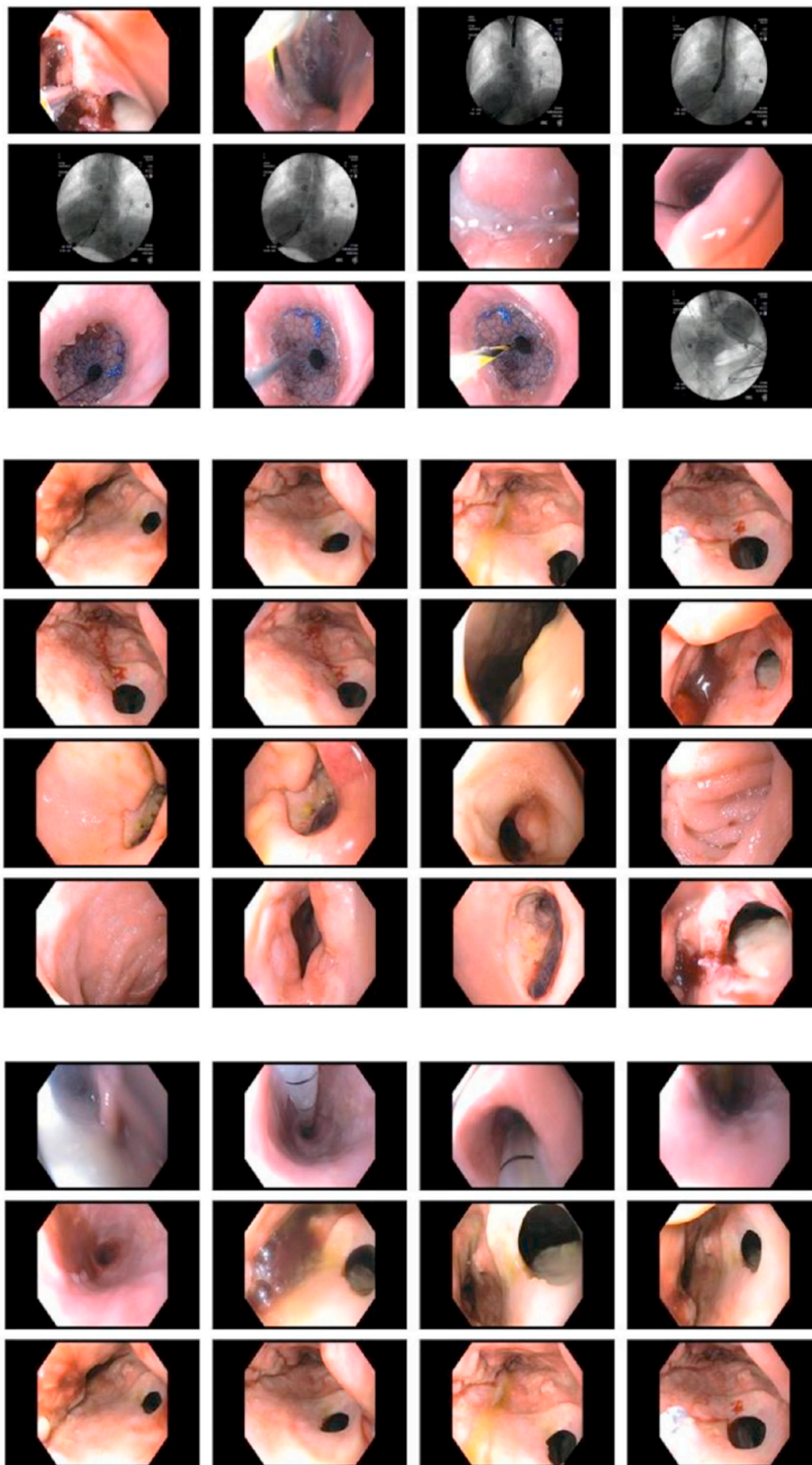


Fig. 3. (A, B, C): EGD revealing posterior esophageal rupture and gastric ulcers. Friable, nodular, and hemorrhagic mucosa is seen surrounding the perforation. A large 2 cm clot was seen in gastric antrum overlying a possible cratered ulcer (Forest IIB).

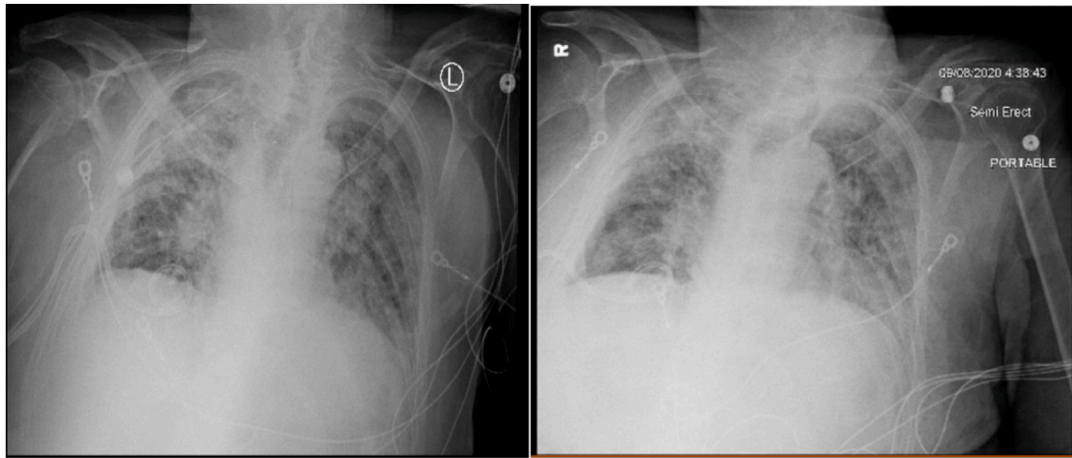


Fig. 4. (A & B)- A- Interval placement of worsening right-sided pleural effusion and placement of right-sided basal pigtail catheter. B-No improvement seen after three days.

worsening infiltrates bilaterally suggestive of mediastinitis and evolving acute respiratory distress syndrome (Figure-5). We explained the need of re-intubation to the family with an extensive discussion about the prognosis and advanced care options. Intubation was declined as per the family's wishes, and the patient succumbed the next day (hospital day 10) to acute hypoxic respiratory failure.

3. Discussion

Since first recognized by Herman Boerhaave in 1724, spontaneous rupture of the esophagus has been described in medical literature as a medical emergency. Given an exceedingly high mortality rate (20–40%), even if diagnosed in a timely fashion, it is important to keep a low threshold considering it as a differential diagnosis in the appropriate clinical picture. The use of Mackler's triad (vomiting, chest pain, and subcutaneous emphysema) and imaging studies (chest x-ray and C.T. scans) in establishing the diagnosis is becoming the usual practice in critical care. The literature reviews have been done to establish the epidemiology, risk factors, and complications of Boerhaave Syndrome. The complications including pleuritis, pneumothorax, hydrothorax, pneumomediastinum, mediastinitis, and acute respiratory distress syndrome can be avoided by early diagnosis leading to a reduction in the high mortality rate [1,2].

The Boerhaave syndrome can be divided into spontaneous esophageal perforation (5.5%) and secondary to traumatic instrumentation (>60%) and foreign body ingestion (>15%). Some of the less common miscellaneous causes include pill reaction, strictures, malignancy, Barrett's esophagus, and peptic ulcer disease [3]. These esophageal ruptures most commonly (75–90%) present with left-sided pleural effusion as compared to the right side. Several anatomical factors play a role in this predilection, including the organization of the submucosal muscular layer, connective tissue architecture, penetrating neurovascular bundles, and fewer surrounding organs on the left esophageal wall. The left posterolateral wall of the distal esophagus is considered the most common site for perforation with a predilection for left-sided pleural effusion, whereas right-sided effusion is suggested to have a high likelihood for mid-esophageal tear [4,5].

The presence of fungal organisms in pleural effusions (fungal empyema) typically occurs following pneumonia, invasive fungal infection, esophageal rupture, gastro-pleural fistula formation, subdiaphragmatic abscess, and repetitive thoracenteses [6–8].

The diagnosis of fungal empyema is established with the following criteria:

[1] exudative pleural fluid with evidence of fungal infection [2], systemic signs of infection such as fever & leucocytosis, and [3] isolation

of same fungal species from other body fluids, cultures, sputum providing evidence of tissue invasion. Our patient met all three criteria along with evidence of fungal infection in the esophagus, confirming the diagnosis of fungal empyema. To the best of our knowledge, this is the fifth CASE reported in the medical literature with right-sided fungal empyema secondary to spontaneous esophageal perforation [9–11].

The incidence of *Candida* empyema in esophageal perforation is increasingly acknowledged. Approximately 25% of the healthy individuals may have candida colonization in the esophagus as normal flora. However, aggressive infections with *Candida* such as empyema are usually preceded with an immunocompromised state, transplant patients, and major thoracoabdominal invasive interventions. *Candida albicans* is one of the most common fungal organisms seen in pleural effusions, followed by *Candida tropicalis* seen in our patient.

The sudden deterioration of our patient and cultures of *Staphylococcus lugdunensis*, *Lactobacillus*, and different *Candida* species in empyema was highly suspicious for underlying esophageal rupture. Unfortunately, we were not able to test the patient for HIV to rule out immunodeficiency. However, the patient had several risk factors such as advanced age, history of hiatal hernia, and recent excessive NSAID use, which may have contributed to the spontaneous rupture of the esophagus and subsequent fungal empyema [12]. As the initial presentation is nonspecific in nature, the diagnosis of Boerhaave syndrome can often be delayed. Although fungal empyema is an uncommon infection, it carries a very high mortality rate (61.9–73%) [13]. Factors such as immunosuppression, severe liver disease, acute respiratory failure, delayed diagnosis, and lack of source control are described to contribute to mortality of fungal empyema [14]. Primary surgical repair is the gold standard treatment for esophageal ruptures. Esophageal stenting, endoscopic clipping and esophagectomy are alternative treatment options in appropriate clinical settings. The hemodynamic compromise, multiple comorbidities, advanced mediastinal sepsis, and clinical intolerance of extensive surgical repair are reasonable grounds to opt for endoscopic stenting, as in our patient [15]. Conservative management may be tried for milder and well-contained perforations, but aggressive surgical management, antibiotics, and volume resuscitation are the mainstay of treatment for Boerhaave syndrome.

4. Conclusion

This manuscript discusses a rare presentation of fungal empyema on the right side of the chest wall, along with a literature review to raise awareness among clinicians about the acute presentation of esophageal perforation. Fungal empyema is an uncommon but overly aggressive systemic infection. As the nature of its presentation can be nonspecific

initially, the diagnosis is often delayed. Esophageal rupture (Boerhaave syndrome) is one of the possible causes of fungal empyema, especially in critically ill patients with relevant clinical history. Despite management with antifungals, vasopressor support, and surgical intervention, the prognosis is often very poor.

Ethics approval and consent to participate

We reviewed the CASE report and manuscript with Research Department and Ethics Committee. No experimental intervention was performed, and it did not require any specification of guidelines, legislations or permissions.

Consent for publication

We contacted the patient and family during the hospital stay and after discharge. We obtained consent to use patient data, images, and blood work to publish CASE for purely educational and research purposes.

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Authors' contributions

- Manuscript written and data obtained by S.S., A.J. (1) and A.J. (2).
- Proofreading and literature review done by S.A. and N.M.

Declaration of competing interest

No competing financial or personal interests are involved for all the

authors.

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