

CLINICAL VIGNETTE

Empyema Secondary to Esophagopleural Fistula of Unclear Etiology

Nalini Rajagopal, M.D. and Patricia Eshaghian, M.D.

Case Report

A 65-year-old homeless male was transported by paramedics to the emergency room complaining of severe shortness of breath and bilateral chest pain, worse on the right. The patient had been homeless for approximately four years and lived on the streets of Santa Monica. He reported progressive dyspnea with exertion for several weeks and could only walk 10-20 feet before having to stop due to shortness of breath. On the night prior to admission, while watching television he noted sudden onset of severe shortness of breath and right-sided pleuritic chest pain, described as a "fire in the lung on the right." The discomfort progressed and he collapsed on the street due to pain and dyspnea. A bystander called paramedics and he was brought to the Emergency Department.

On arrival to the Emergency Department, the patient's temperature was 97.5° F and his O₂ saturation was 100% with minimal oxygen supplementation, though he desaturated with conversation. His blood pressure was 107/67 with a heart rate on 106 on admission. On physical exam he was in mild respiratory distress, using his accessory muscles. He had poor hygiene and was edentulous. Trachea was midline and he had dullness in the right lower lung field, with decreased breath sounds, poor air entry and scattered crackles in the right upper lung. The left lung was clear to auscultation and percussion. Cardiac exam was significant for tachycardia without murmurs, rubs or gallops and his abdominal exam was nontender with normoactive bowel sounds. Chest x-ray (Figure 1) revealed a right hydropneumothorax and a right lower lobe opacity, appearing to be a combination of pleural effusion and parenchymal consolidation. Non-contrast chest CT (Figure 2) showed a right lower lobe necrotizing pneumonia and a right hydropneumothorax. The patient was admitted to the medical ICU for closer monitoring.

A chest tube drained 150cc of serosanguinous fluid with pieces of necrotic tissue. Over the next 2 days, chest tube output exceeded 3 liters daily and appeared purulent intermittently. Pleural fluid culture grew E. coli, beta Strep group G, and viridans Streptococcus and the patient was treated with broad-spectrum antibiotics. Pleural fluid cytology showed no malignancy. Repeat chest CT showed trapped right lung with minimal improvement of the empyema and necrotizing pneumonia 2 days after chest tube placement (Figure 3). A thoracic surgery consult was obtained for trapped lung and empyema and the patient underwent VATS-decortication. The next day, chest tube output volume remained high and the color and consistency of the output changed with the patient's oral intake. For instance, when the patient drank milk, the chest tube drained milky white fluid. Pleural fluid analysis was negative for chylothorax. An esophagram subsequently revealed a very large (4-5cm) distal esophageal perforation with brisk extravasation of contrast into the right pleural space (Figure 4). The patient ultimately consented to esophageal repair despite the high-risk nature of the surgery. The esophageal perforation was repaired with a latissimus dorsi flap. Esophageal biopsy specimens were negative for malignancy. The esophageal repair was complicated by distal perforation, worsening empyema with multidrug resistant organisms and surgical wound dehiscence. His mental status also progressively worsened. While undergoing a brain CT for evaluation of altered sensorium, he suffered a cardiopulmonary arrest, was resuscitated but remained non-responsive. Ultimately, life-sustaining support was withdrawn after discussion with the patient's family, in concordance with the patient's previously expressed wishes.

Background

Esophagopleural fistula is a rare condition, but represents one of the more common complications of esophageal perforation. Anatomically, the esophagus is in direct contact with the lung pleura for a considerable distance on the right side, whereas on the left side, the aorta lies in between the esophagus and the pleura, except for a short distance just above the diaphragm. Therefore, processes in the esophagus can spread more easily to the right side of pleura rather than the left, as is the case with esophagopleural fistula^{1,2}.

Esophageal fistula is usually an acquired lesion in adults. Most occur as a complication of intrathoracic malignancies but they can also occur as a complication of prolonged tracheal intubation, esophageal instrumentation, infection or trauma.^{3,4} Esophagopleural fistulas specifically are associated with advanced esophageal carcinoma, esophageal tuberculosis, surgical procedures, endoscopic examinations, chemical injury and radiation therapy¹.

Clinical Presentation

Patients usually seek medical attention 7-10 days after bacteria have entered the lung and present with necrotizing pneumonia, lung abscess or empyema⁵. The infection begins as an uncomplicated parapneumonic effusion with free-flowing exudate and a normal pH. If untreated, the effusion increases with bacterial invasion with decreasing pH. Once purulence develops, the fluid collection is considered an empyema.

Clinical symptoms associated with esophagopleural fistulas are non-specific and include chest pain, fever, dysphagia and dyspnea⁶. Empyema and pleural effusion with or without esophagopleural fistula may clinically manifest as cough, excess sputum production, malaise and night sweats. Physical exam findings include decreased breath sounds, decreased fremitus and dullness to percussion.

Diagnosis

The presence of food material in the pleural fluid is highly suggestive of an esophagopleural fistula⁷. Identification of multiple organisms can also indicate the presence of an empyema and possibly a communication with the GI tract, however imaging is needed to confirm the diagnosis of esophagopleural fistula.

The radiographic signs of esophagopleural fistulae depend on the site, duration and severity of the perforation. CT findings associated with esophagopleural fistulae are similar to those seen on chest radiographs. Pleural effusions are seen in most cases and are non-specific however pneumothorax is often present and is more specific for esophagopleural fistula than other entities. Extravasation of oral contrast into the pleural space is pathognomonic for an esophagopleural fistula. Since this can identify the site of communication between the esophagus and pleural space, CT has been regarded as the imaging modality of choice for diagnosis⁶. The major advantages of CT are the sensitivity (as even minute amounts of air or fluid can be identified), and the fact that there is little need for patient cooperation (in contrast to esophagography, which can be difficult to perform in seriously ill patients).⁸ Other processes that can mimic esophagopleural fistula are aspiration pneumonia, lung abscess, spontaneous pneumothorax, pulmonary emboli and bronchopleural fistula.

Esophagography with gastrografin (meglumine diatrizoate), a water soluble contrast agent, can be used when esophageal perforation is clinically suspected because it is rapidly absorbed from the mediastinum. However, this agent should not be allowed to enter the tracheobronchial tree as it may cause pulmonary edema due to its hyperosmolarity.¹

Management

Untreated fistulae result in continued respiratory contamination, sepsis and death. However, even with appropriate procedural intervention, prognosis is poor if the mediastinum is involved^{3,6,9}. Management of esophagopleural fistula involves medical treatment of the effusion/empyema that results from the fistula as well as correction of the fistula itself². Complete drainage of the empyema and obliteration of the empyema cavity by lung expansion can be addressed following closure of the esophagopleural fistula. Fistula closures can be closed with self-expanding metal stents or by surgical closure, usually with a muscle flap^{2,7}.

Systemic antibiotics should be administered for at least 4-6 weeks for sterilization of the empyema cavity. In addition to chest tube drainage and antibiotic treatment, management of empyema may require additional drainage by CT guidance or thoracoscopy and possibly decortication¹⁰.

Conclusion

Esophageal perforation and esophagorespiratory fistulas lead to further pathology in the mediastinum, tracheobronchial tree, pleura, and lung. The most common complications include mediastinitis, empyema and aspiration pneumonia⁶. Because of the potentially high morbidity and mortality associated with these complications, early diagnosis with imaging is important. Management involves treatment of the empyema with antibiotics and correction of the esophagopleural fistula by stenting or surgical closure.

Figure Legend



Figure 1: Initial chest xray showing a right hydropneumo-thorax



Figure 2: Initial chest CT with findings suggestive of a right lower lobe necrotizing pneumonia in addition to a hydropneumothorax.

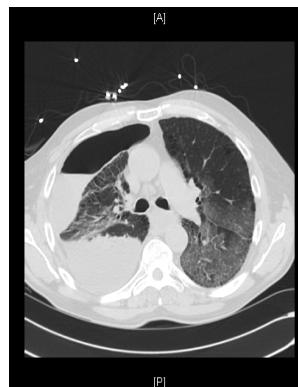


Figure 3: Persistent empyema with evidence of trapped lung.



Figure 4: Extravasation of contrast from the distal esophagus into the right pleural space on esophogram.

REFERENCES

1. Giménez A, Franquet T, Erasmus JJ, Martínez S, Estrada P. Thoracic complications of esophageal disorders. *Radiographics*. 2002 Oct;22 Spec No:S247-58. Review. PubMed PMID: 12376614.
2. Chuah BY, Khoo KL, Khor CJ. Clinical challenges and images in GI. Esophagopleural fistula. *Gastroenterology*. 2008 Apr;134(4):919, 1275. PubMed PMID: 18395073.
3. Han YM, Song HY, Lee JM, Cho SI, Chung GH, Kim CS, Sohn MH, Choi KC. Esophagorespiratory fistulae due to esophageal carcinoma: palliation with a covered Gianturco stent. *Radiology*. 1996 Apr;199(1):65-70. PubMed PMID: 8633174.
4. Lee S, Mergo PJ, Ros PR. The leaking esophagus: CT patterns of esophageal rupture, perforation, and fistulization. *Crit Rev Diagn Imaging*. 1996 Dec;37(6):461-90. Review. PubMed PMID: 8993946.
5. Sahn SA, Light RW. The sun should never set on a parapneumonic effusion. *Chest*. 1989 May;95(5):945-7. PubMed PMID: 2707086.
6. Wechsler RJ. CT of esophageal-pleural fistulae. *AJR Am J Roentgenol*. 1986 Nov;147(5):907-9. PubMed PMID: 3490162.
7. Chervenakov A, Tzekov C, Grigorov GE, Chervenakov P. Acquired benign esophago-airway

- fistulas. *Eur J Cardiothorac Surg.* 1996;10(9):713-6. PubMed PMID:8905271.
8. **Heffner JE, Klein JS, Hampson C.** Diagnostic utility and clinical application of imaging for pleural space infections. *Chest.* 2010 Feb;137(2):467-79. Review. PubMed PMID: 20133295.
9. **Berkmen YM, Auh YH.** CT diagnosis of acquired tracheoesophageal fistula in adults. *J Comput Assist Tomogr.* 1985 Mar-Apr;9(2):302-4. PubMed PMID: 3973154.
10. **Colice GL, Curtis A, Deslauriers J, Heffner J, Light R, Littenberg B, Sahn S, Weinstein RA, Yusen RD.** Medical and surgical treatment of parapneumonic effusions : an evidence-based guideline. *Chest.* 2000 Oct;118(4):1158-71. Review. Erratum in: *Chest* 2001 Jan;119(1):319. PubMed PMID: 11035692.

Submitted on June 6, 2012