

# A Rare Case of Pleural Empyema After Coinfection With *Hathewayia limosa* and *Bacteroides fragilis*

## Introduction

Pleural empyema refers to the accumulation of fluid in the pleural cavity, the space between the visceral and parietal pleura. It is commonly associated with pneumonia but can also occur due to thoracic surgery or trauma. Sources of infection typically include gram-positive organisms, namely *Streptococcus* species and *S. aureus*. If left untreated, pleural empyema has the potential to cause significant morbidity and mortality.<sup>1</sup>

## Case Presentation

A 59-year-old male with a history of hypertension and smoking presented to the hospital with shortness of breath. The shortness of breath had worsened over one week and was associated with a nonproductive cough. He was hemodynamically stable and was afebrile on admission. Initial workup included arterial blood gas analysis (table 1) and a chest X-ray, which was unremarkable.<sup>2</sup>

pH	pO <sub>2</sub>	PCO <sub>2</sub>
6.95	74 mmHg	70 mmHg

Table 1. Arterial blood gas analysis on admission

## Clinical Course

- **Hypercapnic respiratory failure** indicated the use of mechanical ventilation.
- On day 1, a CT chest scan revealed mild **alveolar opacities** bilaterally (right greater than left), suggesting edema or pneumonia and emphysema (fig 1).
- HIV, COVID-19, influenza, and RSV testing were negative.
- Sputum cultures grew *Haemophilus influenzae* and the patient was started on IV ceftriaxone (2g) as a result.
- On day 4, the patient became febrile (101°F) and a repeat CT chest scan revealed **bilateral lung consolidation** and **right-sided fluid collection** (fig 2).
- Due to possible **empyema thoracic**, surgery was consulted to perform a thoracotomy. A chest tube was placed to drain the brown, purulent fluid.
- Further analysis revealed severe destruction of the right lung parenchyma with **fibropurulent exudate** in the pleural space.
- Total **lung decortication** was performed to remove the fibrinous material.
- Cultures of the pleural fluid grew *Hathewayia limosa* and *Bacteroides fragilis*, which were identified by MALDI-TOF mass spectrometry.
- IV **metronidazole** (500 mg) was administered 4 times a day for 4 weeks and the patient was discharged.
- Follow up CT chest at 4 months revealed **scar development** and **resolution of the pleural effusion**.

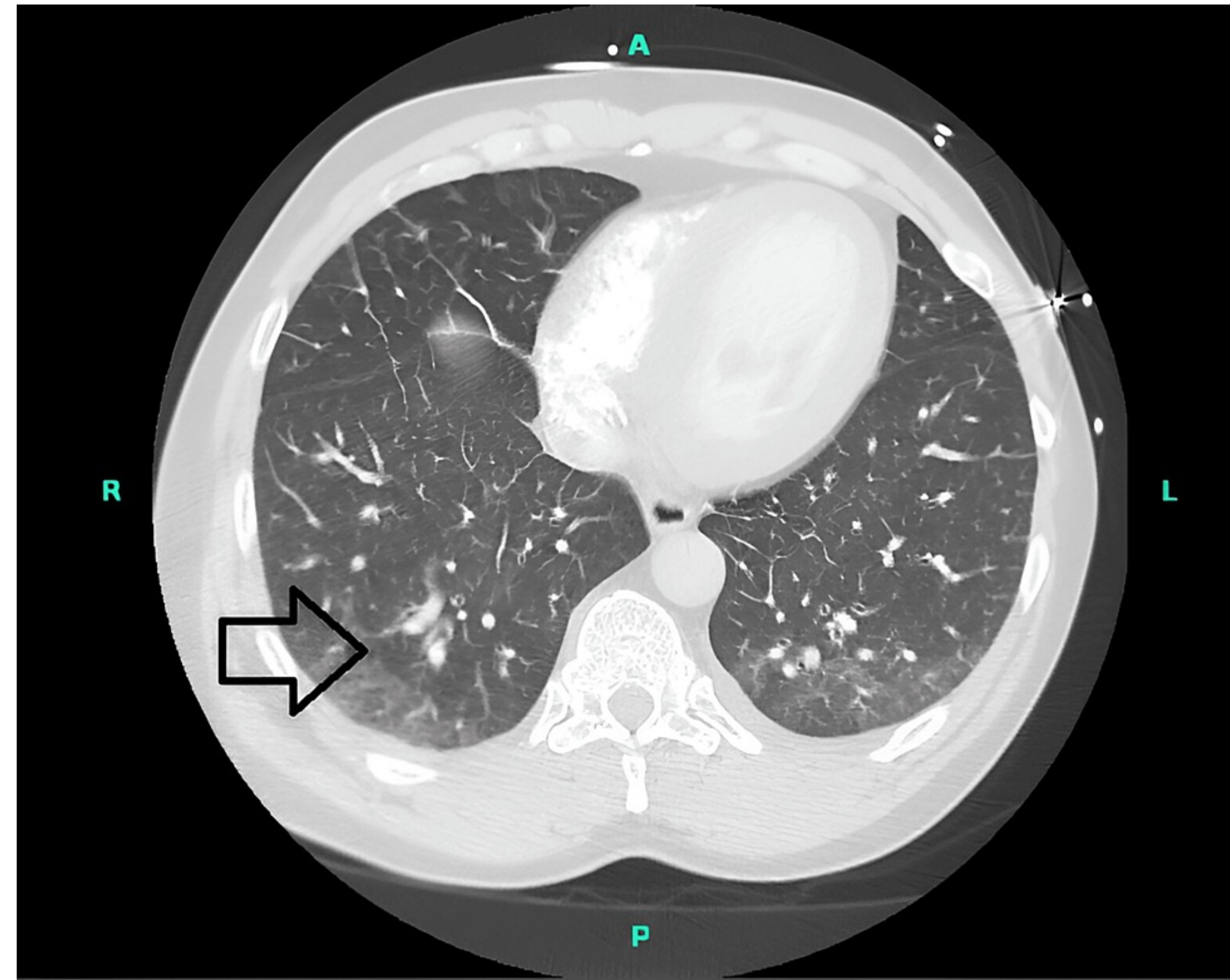


Figure 1. CT chest on admission showed right sided alveolar opacities (arrow), suggesting possible edema/ pneumonia and emphysema. Left lung showed similar consolidation but to a lesser degree.<sup>2</sup>

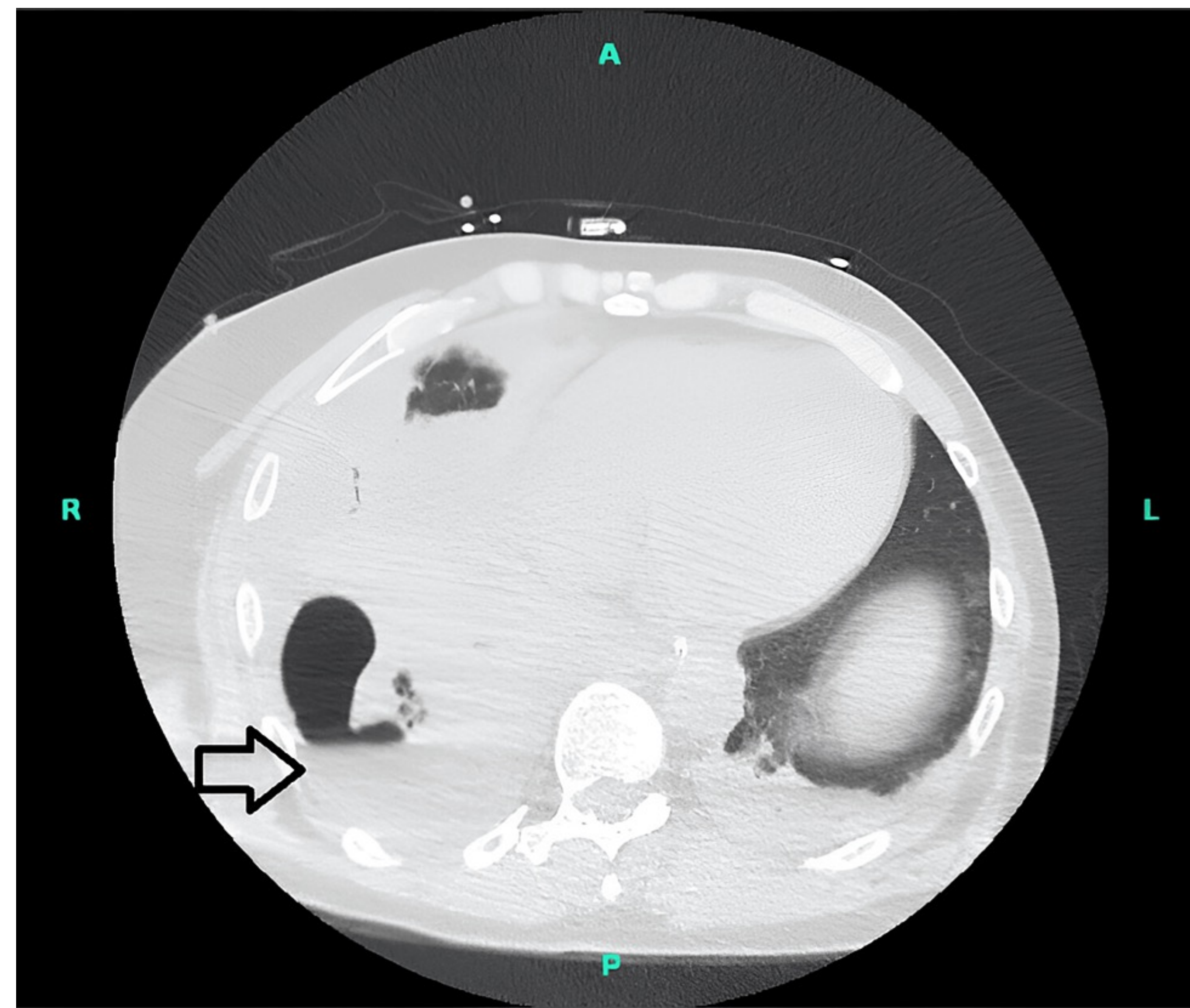


Figure 2. CT chest on day 4 showed fluid collection in the right pleural space (arrow) and bilateral lung consolidation.<sup>2</sup>

## Discussion

- *Hathewayia limosa* is a gram-positive anaerobic spore forming bacillus that is typically found in soil and the intestinal tracts of animals. It destroys tissue through the action of collagenases and lecithinases.<sup>3</sup>
- *H. limosa* has been indicated as the causative organism in cases of prosthetic valve endocarditis and other infections involving the GI and integumentary system.<sup>3-5</sup> Pleuropulmonary disease with *H. limosa* is very rare and is usually preceded by trauma and surgical treatments.<sup>7</sup>
- *Bacteroides fragilis* are a group of gram-negative rods that are commonly found in the human gut. Their coexistence with *H. limosa* has been shown previously.<sup>4-6,8</sup>
- Aspiration of oropharyngeal contents, the thoracotomy, or contact with soil containing *H. limosa* may have introduced this bacterium in the pleural space.
- Treatment of empyema involves both antimicrobials and surgery. Empiric antibiotic use and chest tube drainage may be enough to prevent further progression to later stages, but decortication and open thoracotomy may be necessary in advanced stages.<sup>1</sup>
- The use of metronidazole after decortication proved to be successful for our patient, but reduced susceptibility has been reported.<sup>9</sup>
- Antimicrobial susceptibility testing should be performed to ensure proper treatment early on.

## Conclusions

This is the first reported case of pleural empyema caused by *H. limosa*. Conventional treatments used for empyema proved to be effective in treating our patient, but resistance patterns should be noted before committing to a treatment plan. Early recognition is critical to reduce morbidity and should include surgical evacuation when indicated. While extremely rare, clinicians should not disregard this organism in their assessment, as it can cause significant morbidity and mortality.

## References

1. Garvia V, Paul M. Empyema. [Updated 2023 Aug 7]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK459237/>
2. Mada P, Khan M H (February 28, 2024) Hathewayia limosa Empyema: A Case Report. Cureus 16(2): e55156. doi:10.7759/cureus.55156
3. Cato ep, Cummins cs, Smith lds. Clostridium limosum andré in prévot 1948, 165 amended description and pathogenic characteristics. Int j syst evol microbiol. 1970;20(3):305-316. Doi:10.1099/00207713-20-3-305.
4. Gordon G, Axelrod JL. Case report: prosthetic valve endocarditis caused by Pseudallescheria boydii and Clostridium limosum. Mycopathologia. 1985;89(3):129-134. doi:10.1007/BF00447020
5. Ferreira CEA, Nakano V, Avila-Campos MJ. Cytotoxicity and antimicrobial susceptibility of Clostridium difficile isolated from hospitalized children with acute diarrhea. Anaerobe. 2004;10(3):171-177. doi:10.1016/j.anaerobe.2004.02.003
6. Shibuya H, Terashi H, Kurata S, et al. Gas Gangrene Following Sacral Pressure Sores. J Dermatol. 1994;21(7):518-523. doi:10.1111/j.1346-8138.1994.tb01786.x
7. Spagnuolo PJ, Payne VD. Clostridial Pleuropulmonary Infection. CHEST. 1980;78(4):622-625. doi:10.1378/chest.78.4.622
8. Salyers AA. Bacteroides of the human lower intestinal tract. Annu Rev Microbiol. 1984;38:293-313. doi:10.1146/annurev.mi.38.100184.001453
9. Erikstrup LT, Danielsen TKL, Hall V, et al. Antimicrobial susceptibility testing of Clostridium difficile using EUCAST epidemiological cut-off values and disk diffusion correlates. Clin Microbiol Infect. 2012;18(8):E266-E272. doi:10.1111/j.1469-0691.2012.03907.x