Navigating Airway Dilemmas in Massive Lung Abscess: A Case Report of Risking Rupture to Save Ventilation

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Abstract

Background: Lung abscess is a necrotizing infection with cavitary lesions and air fluid levels, most often from aspiration, hematogenous spread, or bronchial obstruction. Despite better antibiotics, large abscesses remain difficult to manage, especially with respiratory failure and altered consciousness.

Case: A 49-year-old woman with uncontrolled hypertension who presented with progressive shortness of breath, cough, and fever. On admission to the Respiratory Intensive Care Unit (RICU), the patient appeared acutely ill, with a Glasgow Coma Scale of E4M6V4 and signs of systemic inflammation, hypoalbuminemia, and elevated D-dimer. Chest imaging revealed a large cavitary lesion in the left lower lobe (9.4 × 12.5 × 12.4 cm) with segmental atelectasis. PaO_2/FiO_2 ratio was 210, indicating mild oxygenation impairment. Blood cultures yielded *Staphylococcus haemolyticus*. Due to declining consciousness and respiratory effort, the patient underwent endotracheal intubation with lung-protective ventilation. A chest tube was placed, draining 300 mL of purulent fluid. The patient improved clinically and radiographically and was discharged, with successful extubation and recovery over ten days.

Discussion: This case shows that managing a massive lung abscess in a critically ill patient demands individualized, multidisciplinary decisions that balance airway protection, infection control, and procedural safety, using head-up RSI with minimal-pressure ventilation and early cuff inflation, strict lung-protective settings, and timely chest-tube drainage. Stabilization was achieved despite a negative sputum culture and *Staphylococcus haemolyticus* bacteremia, in the context of complicating comorbidities.

Conclusion: Timely intubation and individualized drainage strategies using a multidisciplinary approach are essential in managing large pulmonary abscesses in critically ill patients.

Keywords: airway management, chest tube drainage, critical care, endotracheal intubation, lung abscess

INTRODUCTION

Lung abscess is a necrotizing infection of the lung parenchyma, characterized by cavitary lesions with air-fluid levels due to tissue destruction. Common causes include aspiration of oropharyngeal contents, hematogenous

spread, or obstruction. Despite advances in antibiotics reducing mortality, management remains challenging, especially in large abscesses or patients with worsening respiratory or neurological status.[1–4]

Airway management in such cases is complex, especially when patients are present with an altered mental status or progressive respiratory failure. Endotracheal intubation and mechanical ventilation offer definitive airway protection but carry specific risks in large abscesses, notably rupture and massive aspiration. Therefore, timing and selection of interventions such as chest tube drainage must be carefully considered to avoid complications like bronchopleural fistula or worsening sepsis.[5,6]

In critically ill patients, especially with fragile pulmonary structures, ventilation decisions require tailored, multidisciplinary approaches. This report presents a case that shows the dilemma of securing the airway while limiting iatrogenic injury in a massive lung abscess.[2,7,8]

CASE

A 49-year-old woman with a history of poorly controlled hypertension presented with progressive shortness of breath, non-productive cough, and low-grade fever. The patient also reported poor oral health with dental caries, which could have served as a potential source of infection. The patient had no history of diabetes mellitus, neurological disorders, alcohol consumption, smoking, or illicit drug use.

On admission to the Respiratory Intensive Care Unit (RICU), the patient was acutely ill with a GCS of E4M6V4. Vital signs showed hypertension, tachycardia, tachypnea, and peripheral oxygen saturation was 96 percent on a 10 L per minute non-rebreather mask.

Physical examination revealed decreased breath sounds and dullness in the left lung field. Laboratory findings showed hypoalbuminemia, elevated D-dimer, leukocytosis with neutrophilia, elevated C-reactive protein (CRP), and increased erythrocyte sedimentation rate (ESR). Arterial blood gas analysis revealed a PaO_2/FiO_2 ratio of 210, indicating mild oxygenation impairment.

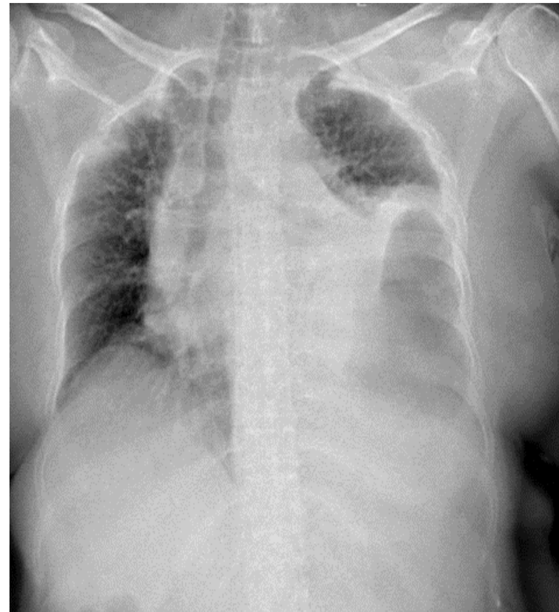

Figure 1. Lower lobe lung abscess with surrounding consolidation and segmental atelectasis.

Imaging showed a large cavitary lesion in the left lower lobe (9.4 × 12.5 × 12.4 cm) with segmental atelectasis, consistent with a lung abscess. Chest radiograph reveals a large, thick-walled, cavitary lesion with an air-fluid level in the

left lower lobe, producing mass effect and rightward mediastinal shift, consistent with a pulmonary abscess (Figure 1).

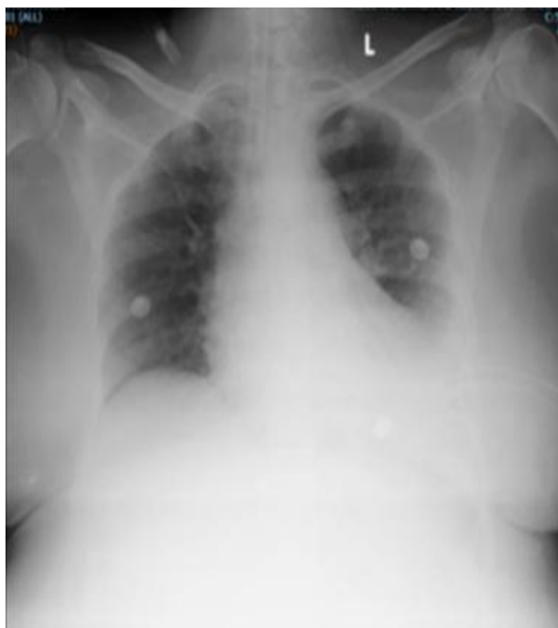

Figure 2. Post-intubation imaging shows a partially decompressed cavity with a reduced air-fluid level

Subsequent chest X-ray confirms the presence and extent of the cavitary lesion, further delineating its abscess characteristics (Figure 2).

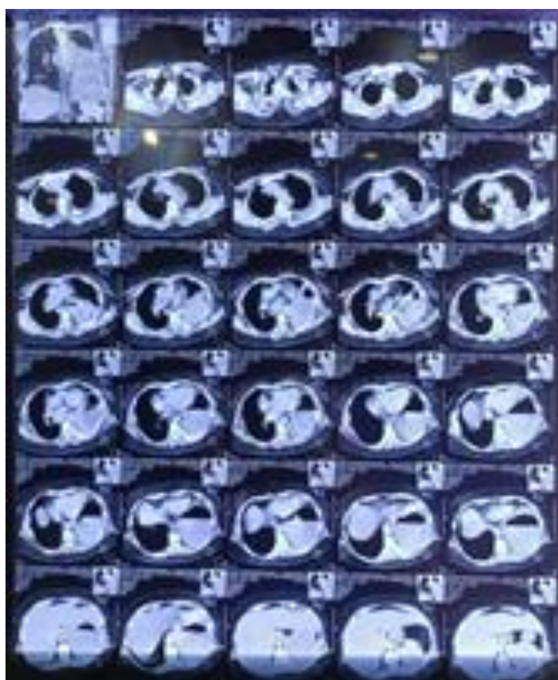

Figure 3. Left lower lobe abscess with a well-defined cavity and an air-fluid level

Post-intubation radiograph demonstrates partial decompression of the cavity, evidenced by a reduction in the air-fluid level, indicating interval change likely related to altered intrapulmonary dynamics following airway intervention (Figure 3).

Empiric broad-spectrum antibiotics were initiated with intravenous Meropenem 1 g every 8 hours plus Metronidazole 500 mg every 8 hours to cover aerobic/anaerobic gram-negative organisms. Sputum Gram stain demonstrated gram-positive cocci and gram-negative bacilli, and subsequent blood cultures yielded *Staphylococcus haemolyticus*.

As the patient's respiratory effort worsened and consciousness declined, a multidisciplinary airway team, comprising an anesthesiologist, an intensivist, a pulmonologist, a respiratory therapist, and a surgeon on standby, performed controlled endotracheal intubation using rapid-sequence induction and videolaryngoscopy. Post-intubation ventilation followed lung-protective settings (tidal volume 4-6 mL/kg predicted body weight, PEEP titrated to oxygenation targets, plateau pressure <30 cmH_2O).

The empiric antibiotic regimen was continued for 72 hours. Given the massive abscess cavity (>12 cm) with persistent purulence and worsening gas exchange, image-guided drainage was performed using a 24-Fr thoracostomy tube. The tube was connected to −20 cmH_2O suction and irrigated per protocol.

No pleural empyema was present; drainage was performed solely for abscess decompression. The patient showed clinical

improvement and radiographic resolution. The patient successfully weaned off ventilatory support, extubated, and discharged from the RICU after 10 days to continue antibiotic therapy and rehabilitation.

DISCUSSION

Lung abscess requires balancing airway protection, infection control, and procedural safety in critically ill patients. While improved imaging and antibiotics have enhanced outcomes, managing large abscesses with sepsis and respiratory compromise remains complex. This case highlights the challenges in balancing airway protection, infection control, and procedural safety in critically ill patients.[2,8]

Endotracheal intubation is the standard airway management for patients with altered mental status or impending respiratory failure. In this case, declining neurologic status necessitated prompt airway intervention.[9,10]

Intubation was executed with specific precautions to minimize abscess rupture and cross-contamination, which were head-up preoxygenation, rapid-sequence induction with videolaryngoscopy, strictly minimal mask ventilation using very low inspiratory pressures (<12 cmH_2O), immediate cuff inflation before any positive-pressure breaths, and lateral positioning with the affected lung dependent to reduce spillover.[11–13]

Post-intubation ventilation was strictly lung-protective, which used tidal volume 4-6 mL/kg predicted body weight, plateau pressure <30 cmH_2O, driving pressure <15 cmH_2O, and the lowest PEEP compatible with adequate oxygenation. Controlled permissive hypercapnia was accepted (target pH ≥7.20), closed in-line suction was used to prevent circuit breaks, and bronchoscopy for toilet was available if the secretion burden threatened ventilation. With these measures in place, timely chest-tube drainage was performed, leading to stabilization and recovery.[11–13]

Drainage was crucial due to the abscess's large size (>12 cm) and persistent fluid accumulation. Sputum culture showed no growth, while blood cultures confirmed systemic dissemination by *Staphylococcus haemolyticus*, possibly influenced by prior empirical antibiotics.[14,15] The patient's comorbidities, including uncontrolled hypertension and hypoalbuminemia, contributed to clinical complexity.[16,17]

The successful outcome was achieved through early intervention, targeted respiratory support, and coordinated multidisciplinary care.[18] This case underscores the importance of individualized treatment strategies based on clinical presentation, radiological findings, and procedural risk.[19,20]

CONCLUSION

In large lung abscesses with sepsis and reduced consciousness, early airway protection when indicated, along with individualized image-guided drainage aligned with clinical status and imaging, is key, supported by multidisciplinary care.

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