



INTEGRATED APPROACH TO COPD COMPLICATED BY KLEBSIELLA - NECROTIZING PNEUMONIA AND EMPYEMA: A CASE PRESENTATION

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ABSTRACT India has the dubious distinction of ranking first in lung disease deaths in the world. Chronic obstructive pulmonary disease (COPD) is a chronic inflammatory lung disease that causes obstructed airflow from the lungs. Chronic obstructive pulmonary disease (COPD) is the third leading cause of death globally. COPD, which causes the small airways to narrow and lung tissue to cease functioning, has long been disregarded and neglected. COPD is common for those aged 40 and older. COPD is a chronic disease that causes shortness of breath and makes breathing difficult and less effective. COPD complicated by *Klebsiella pneumoniae* involves a prompt diagnosis, appropriate antibiotic therapy, and management of COPD aggravation. Necrotizing pneumonia is characterized by necrosis and produces cavities in the lung tissue. It is a rare but serious complication of pneumonia, particularly in individuals with COPD.

KEYWORDS : Empyema thoracis (ET), Chronic obstructive pulmonary disease (COPD), Chronic obstructive pulmonary disease (COPD), Necrotizing pneumonia

INTRODUCTION

Empyema thoracis (ET), characterized by the accumulation of pus, is an infection of the pleural cavity (1) It can also lead to certain complications, such as pleural thickening, fibrosis, and certain potentially life-threatening conditions such as septicemia, necessitating a thorough understanding of its clinical implications and treatment modalities (2,3) Pneumonia is one of the most common infectious diseases in patients with COPD.(4)

Chronic obstructive pulmonary disease (COPD) is a common and debilitating respiratory condition characterized by persistent airflow limitation (5) It is primarily caused by cigarette smoking and is often associated with comorbidities such as diabetes mellitus and cardiovascular disease (6) Acute exacerbations of COPD can lead to significant morbidity and mortality, particularly when complicated by secondary infections such as community-acquired pneumonia (CAP) and empyema (7) *Klebsiella* species are a common cause of pneumonia and empyema, especially in individuals with underlying respiratory conditions and alcoholism (8)

Klebsiella pneumoniae empyema is associated with a high mortality rate and requires prompt diagnosis and aggressive management (9) COPD is a chronic inflammatory disease characterized by irreversible airway obstruction. (10) COPD patients are often colonized with bacteria and viruses that result in airway inflammation. A previous study showed that severe COPD decreased the cytokine response to pathogen-associated molecular patterns and proposed that bacterial colonization may attenuate the systemic innate immune response. (11) COPD is a common lung disease that includes chronic bronchitis and emphysema, exerts a high morbidity in the middle-aged and elderly population (12) Patients with acute exacerbation COPD (AECOPD) usually shows a sudden deterioration in lung function and ultimately death. (13,14)

Pneumonia is the lung disease with the inflammation of terminal airway, alveoli, and pulmonary interstitial. Inflammation has been reported to enhance tumour development. (15,16)

Case Presentation:

Patient Information:

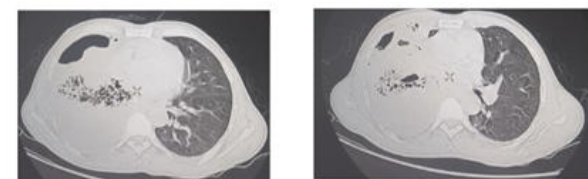
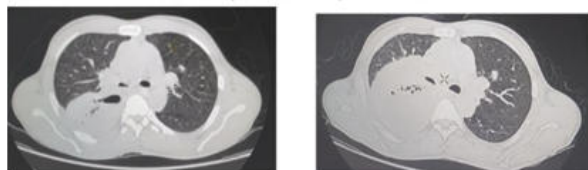
A 55-year-old male daily wage labourer presented with a one-week history of cough with greenish-yellow expectoration, pleuritic chest pain, and worsening shortness of breath. He had a history of smoking

(10 pack-years), alcoholism, and diabetes mellitus.

Clinical Findings:

Physical examination revealed reduced expansion of the right hemithorax, tenderness over specific areas, and auscultatory findings consistent with right-sided pneumonia and empyema. Arterial blood gas analysis confirmed hypoxia, and laboratory investigations showed moderate anaemia, leucocytosis with neutrophilia, and elevated C-reactive protein levels. CT chest scan revealed loculated effusion and Right middle and Lower lobe Necrotizing consolidation with empyema.

NECROTIZING PNEUMONIA (RML and RLL) with COMPLICATED EMPYEMA



Diagnostic Assessment:

Empyema necessitatis (also referred to as empyema necessitatis) is a rare and infrequently reported complication of pneumonia, which involves extension of the empyema and dissecting through chest wall to rest in subcutaneous tissue, with limited data on results of management of such cases. Such complications are worrisome for surgeons as empyema extends to involve other parts of the thoracic cavity. (17)

A complication which is commonly associated with tuberculosis patients requires careful management in means of excluding tuberculosis if it was suggested by history, labs, and radiological findings suggestive of TB. (18) Catheter drainage for empyema necessitatis without surgery has been practiced in rare cases with astounding success (19,20)

Pleural fluid analysis demonstrated Klebsiella complicated empyema, confirmed by sputum and blood cultures showing growth of pan sensitive Klebsiella species (21,22)



Pleural fluid Aspiration Under USG guidance

CULTURE AND SENSITIVITY (PLEURAL FLUID) : (Culture)	
Gram stain	Few Gram(-ve) Rods
Pus Cells	
Bacteria	
Organism Name	<u>Klebsiella pneumoniae</u>
Methodology Name	Automated By Vitek 2
Growth Observed	Heavy Growth
Antibiotics Name	Results
Gentamicin	Sensitive
Amikacin	Sensitive
Ceftazidime	Sensitive
Ceftriaxone	Sensitive
Ciprofloxacin	Sensitive
Co-trimoxazole	Sensitive
Cefotaxime	Sensitive
Cefipime	Sensitive

Pleural Fluid Culture reports

FLUID (LAVAGE FOR CYTOLOGY)	
Brief Clinical History:	
Lobar pneumonia with parapneumonic effusion	
Specimen:	Pleural fluid
Macroscopic Description:	40 ml. of yellowish fluid received. Cell block processed
Microscopic Description:	Smears from the centrifuged deposit of the fluid are cellular and show dense neutrophils and occasional lymphocytes. There is no evidence of atypical cells. Ziehl-Neelsen stain for acid fast bacilli and fungal stain are negative. Cell block shows similar features.
Diagnosis/Comments:	Pleural fluid cytology Dense acute inflammation Kindly correlate with microbiological studies.

Pleural fluid cytology report

RESULTS

The patient was admitted to the ICU and initiated on ceftriaxone therapy. Nutritional and anaemia corrections were made in preparation for surgery (23). Surgical intervention with right middle lobectomy and lower lobectomy was performed, followed by postoperative management including antibiotic therapy, pain management, and incentive spirometry.

Post Surgery - Chest X Ray and Follow up



Tissue HPE report

Diagnosis : Right middle and lower lobectomy and pleural peel:- Features are consistent with Lobar Pneumonia with Empyema.



Post Surgery and Before discharge

DISCUSSION:

This case highlights the challenges in managing acute exacerbations of COPD complicated by community-acquired pneumonia and Klebsiella empyema in a patient with multiple comorbidities (24)

The decision to proceed with surgical intervention was made after careful consideration of the patient's clinical status, radiological findings, and response to initial medical management (25)

Surgical management of empyema remains controversial, particularly in cases with loculated effusion and underlying lung necrosis (26)

In this case, intraoperative findings of multiple loculations and necrotizing lung tissue precluded the placement of an intercostal drainage tube, necessitating surgical intervention for definitive treatment.

Multidisciplinary collaboration between respiratory, infectious disease, surgical, and nutritional teams was essential for optimizing the patient's preoperative status, performing the surgical procedure, and providing comprehensive postoperative care (27)

CONCLUSION

COPD patients have compromised lung defences, making them more vulnerable to infections like those caused by Klebsiella. Some Klebsiella strains, particularly in the hospital setting, are resistant to multiple antibiotics, making treatment challenging. Infections with Klebsiella can worsen COPD symptoms, leading to increased breathlessness, cough, and sputum production. Treatment typically involves antibiotics targeting Klebsiella, but resistance patterns need to be considered. Necrotizing pneumonia is characterized by necrosis and produces cavities in the lung tissue. It is a rare but serious complication of pneumonia. Empyema is a collection of pus in the space between the lung and chest wall particularly in individuals with COPD. Broad-spectrum antibiotics are usually initiated to target likely pathogens. Empyema can be a complication of pneumonia, which is more common in individuals with COPD.

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