Fiberoptic Bronchoscopy in Non-Resolving Pneumonia: Insights from a Case Series Emphasizing Diagnostic Value and Treatment Implications"

Abstract

Non-resolving pneumonia, where radiographic abnormalities persist despite treatment, poses significant diagnostic challenges. It accounts for 10-15% of nosocomial pneumonia cases and significantly contributes to inpatient pulmonary consultations and bronchoscopies. Timely diagnosis and treatment are crucial to reducing mortality rates. This study highlights three cases demonstrating the role of fiberoptic bronchoscopy (FOB) and CT-guided fine needle aspiration cytology (FNAC) in diagnosing underlying causes.

Case 1: A 60-year-old female with a three-month history of dry cough and weight loss showed worsening right lower lobe consolidation and enlarged lymph nodes despite multiple antibiotics. Bronchoscopy and EBUS-TBNA revealed non-small cell carcinoma, likely adenocarcinoma.

Case 2: A 58-year-old male with COPD and chronic bidi smoking presented with progressive breathlessness and persistent lower lobe consolidation. Bronchoscopy and BAL analysis detected Mycobacterium tuberculosis without rifampicin resistance.

Case 3: An 86-year-old female with bilateral lower lobe pneumonia showed collapse consolidation on CT. Bronchoscopy and BAL confirmed Mycobacterium tuberculosis without rifampicin resistance.

These cases underscore the importance of FOB and CT-guided FNAC in diagnosing malignancies and other causes in non-resolving pneumonia.

Keywords

Non-resolving pneumonia, fiberoptic bronchoscopy, CT-guided FNAC, lung cancer, Mycobacterium tuberculosis

INTRODUCTION

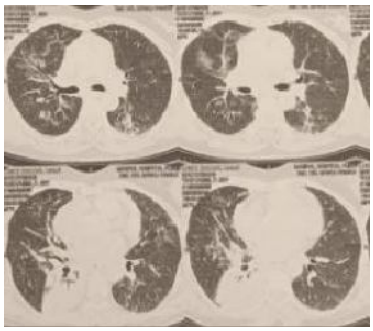
The terms non-resolving or slowly resolving pneumonia are frequently used to describe the persistence of radiographic abnormalities beyond the expected timeframe. A common cause for pulmonary consultation is insufficient knowledge about the anticipated clinical course and outcome of community-acquired or nosocomial pneumonia; this makes patient selection and the timing of further evaluation difficult[1]. Non-resolving pneumonia accounts for 10% - 15% of nosocomial cases and is estimated to be responsible for approximately 15% of inpatient pulmonary consultations and 8% of bronchoscopies[2,3]. Delays in diagnosis and treatment can increase mortality rates by 3-5% in both community-acquired and nosocomial pneumonia. Common causes of non-resolving pneumonia include incorrect diagnosis, inadequate antibiotic therapy, impaired host defense, atypical organisms, resistant pathogens, non-infectious causes, tuberculosis, and endobronchial lesions[4–7]. Persistent or incomplete resolution of pneumonia, despite treatment, necessitates more aggressive evaluation. Fiberoptic bronchoscopy (FOB), computed tomography (CT) scans of the thorax, and CT-guided fine needle aspiration cytology (FNAC) can be useful in evaluating non-resolving pneumonia. Microbiological, cytological, and histopathological tests of specimens can help diagnose the underlying cause. The efficacy of CT-guided FNAC and FOB in diagnosing non-resolving pneumonia has been reported to be around 80% and 70-86%, respectively, in some studies. In this study, we aimed to establish the etiological diagnosis of non-resolving pneumonia and to evaluate the efficacy of diagnostic procedures, particularly FOB and CT-guided FNAC.

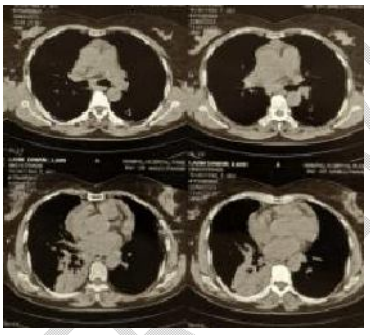
Case presentation :

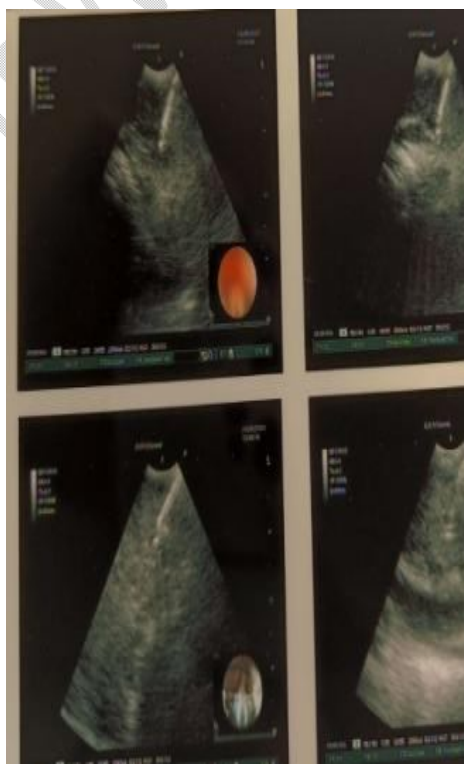
CASE 1

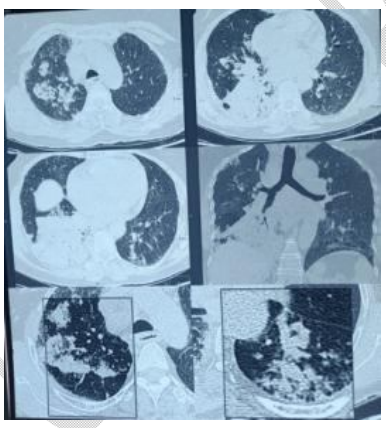
A 60-year-old female was hospitalized with a three-month history of a worsening dry cough, loss of appetite, and a 2 kg weight loss over the past month. She had previously been treated with azithromycin + beta-lactam and levofloxacin + colistin for right lower lobe pneumonia, but sputum cultures and gene xpert tests were inconclusive. Initial chest x-ray and CT scans showed consolidation in the right lower lobe, multiple nodular consolidations, and enlarged mediastinal lymph nodes. Despite three antibiotic courses, follow-up CT scans showed worsening opacification and increased lymph node size. The patient had a history of sputum-positive pulmonary tuberculosis five years ago but no significant family history. Physical examination revealed normal vital signs except for respiratory findings of crepitations, tubular bronchial breath sounds, increased vocal resonance, positive

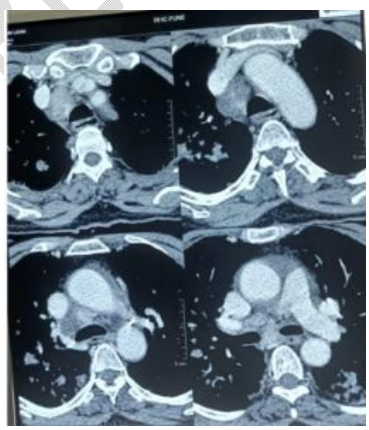
egophony, and whispered pectoriloquy in specific lung areas.. PET-CT scan revealed FDG-avid large consolidation-like lesions in the right lower lobe, multiple opacities in the right upper and left lower lobes, and FDG-avid enlarged lymph nodes. Lytic skeletal lesions were seen in the sacral ala, right acetabulum, and right ischium. Fiberoptic bronchoscopy and EBUS-TBNA were performed, with samples sent for cytology, culture, gene xpert testing, and histopathological examination. The examination revealed non-small cell carcinoma, likely adenocarcinoma. The BAL fluid tested positive for epithelial malignancy, with cytology favoring adenocarcinoma.

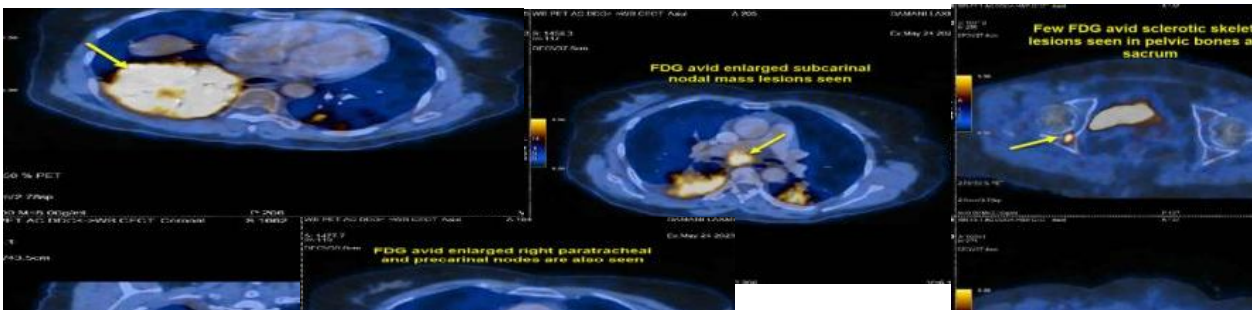






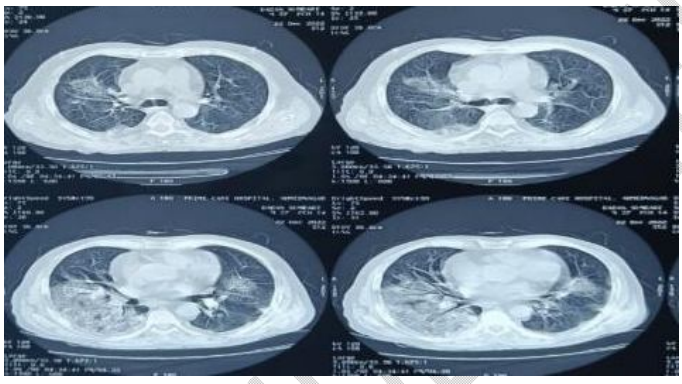


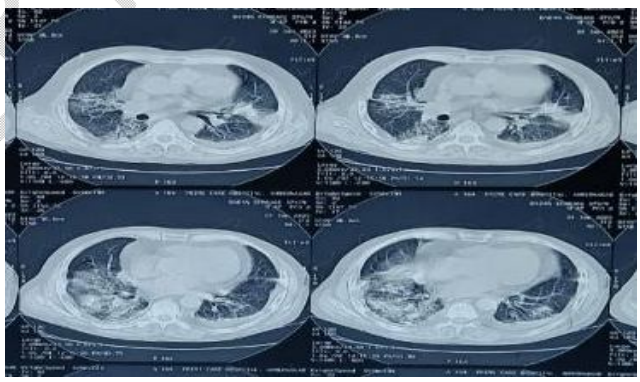




CASE2

A 58-year-old male presented with breathlessness on exertion, progressing from Grade 2 to Grade 3 on the MMRC scale over three months. He reported no cough, fever, hemoptysis, weight loss, loss of appetite, or chest pain. A chronic bidi smoker for 20 years, he has had COPD for 15 years with irregular treatment. In December 2022, he had bilateral lower lobe pneumonia; sputum AFB was negative and culture showed no growth. He was treated with antibiotics. He has no history of hypertension, ischemic heart disease, diabetes, tuberculosis, or COVID-19, and no significant family history.Initial chest X-ray and CT scan showed consolidation in the right middle and lower lobe, and left lower lobe. A follow-up CT scan after one month showed persistent opacification. Physical examination revealed a temperature of 97.5°F, pulse rate of 78/min, respiratory rate of 22/min, blood pressure of 120/80 mm Hg, and oxygen saturation of 94% on room air. No pallor, icterus, lymphadenopathy, or jugular venous distension were noted. Respiratory examination revealed normal vesicular breath sounds except for crepitations in the right and left infrascapular areas, with increased vocal resonance, positive egophony, and whispered pectoriloquy in the right infrascapulararea.Fiberoptic bronchoscopy and BAL sample analysis revealed no culture growth, AFB score of +3, and gene xpert positive for Mycobacterium tuberculosis without rifampicin resistance. First-line LPA indicated sensitivity to rifampicin and isoniazid.

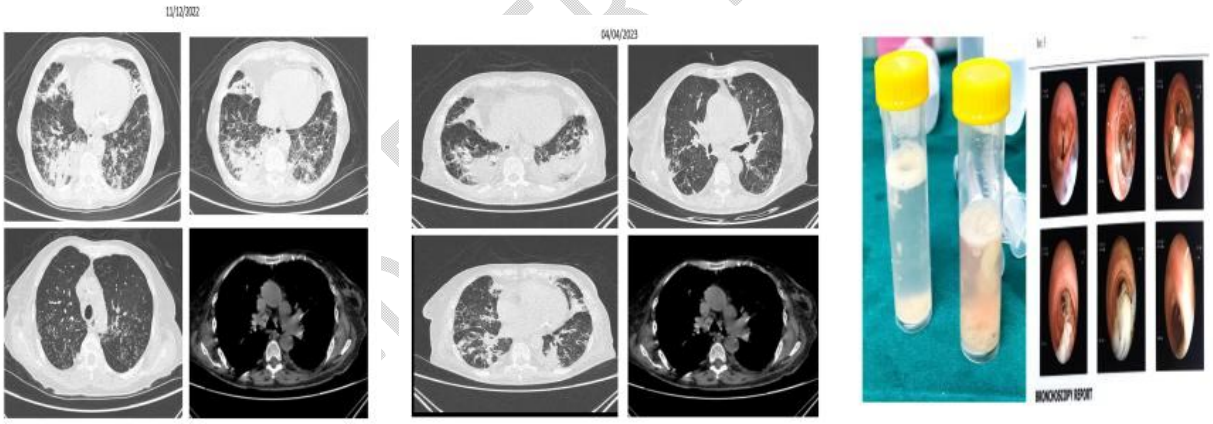




CASE3

A 86-year-old female was admitted with a month-long history of low-grade fever, 15 days of cough with yellow expectoration, loss of appetite, and a 2 kg weight loss. She had childhood bronchial asthma and was hospitalized for bilateral lower lobe pneumonia in December 2022. At that time, sputum culture showed no growth, AFB was negative, and WBC was 17,000 with 92% neutrophils. She was treated with Piperacillin-Tazobactam and Azithromycin for 7 days but declined bronchoscopy and was discharged. Now, she is readmitted with similar symptoms.

Initial chest X-ray and CT scan revealed collapse consolidation and patchy areas of consolidation in both lower lobes, lingula, RML, and RUL. A follow-up CT scan after one month showed persistent opacification. Physical examination revealed a temperature of 99.7°F, pulse rate of 90/min, respiratory rate of 26/min, blood pressure of 100/80 mm Hg, and oxygen saturation of 85% on room air. Respiratory examination showed crepitations in the infrascapular areas, increased vocal resonance, positive egophony, and whispered pectoriloquy on the right.Bronchoscopy and BAL sample analysis revealed no culture growth, negative AFB, and gene xpert positive for Mycobacterium tuberculosis without rifampicin resistance. First-line LPA indicated sensitivity to rifampicin and isoniazid.



DISCUSSION

Non-resolving or slowly resolving pneumonia is not an infrequent clinical entity to pulmonologists, and at the same time, can be a cause of concern in daily clinical practice. Amberson was the first person to describe the term “unresolved organizing or protracted pneumonia” in 1943 (8). There is lack of uniformity regarding definition for non-resolving pneumonia, but in many studies, the entity of “slow resolution” has been defined as failure of radiographic resolution by 50% in 2 weeks or failure of complete resolution by one month despite adequate antibiotic therapy (9).

Fiberoptic bronchoscopy plays a crucial role in the evaluation and management of non-resolving pneumonia. This advanced diagnostic tool allows for direct sampling of lower respiratory tract secretions, revealing causative microorganisms that conventional methods might miss. Particularly in cases where sputum smear tests are negative for pulmonary tuberculosis, fiberoptic bronchoscopy becomes essential. It helps identify underlying causes of persistent pneumonia, with pulmonary tuberculosis being a common etiology (10).

Bronchoscopy plays a crucial role in the diagnosis of malignancy in cases of non-resolving pneumonia. Non-resolving pneumonia, defined as the lack of clinical and radiographic improvement despite appropriate antibiotic therapy, can often be a presentation of underlying malignancy, particularly lung cancer. Bronchoscopy is a key diagnostic tool that allows direct visualization of the bronchial tree and facilitates tissue sampling through techniques such as bronchial biopsies, bronchoalveolar lavage (BAL), and endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA)(11).

The procedure enhances the comprehensiveness of the microbial profile by detecting atypical pathogens. It can also identify potential obstructions, such as foreign bodies or tumors, that may hinder the resolution of pneumonia. By visualizing bronchial anatomy, fiberoptic bronchoscopy aids in diagnosing structural abnormalities that contribute to recurrent infections.In cases where aspiration is suspected, fiberoptic bronchoscopy can assess for the presence of gastric contents in the respiratory tract, which is a common cause of non-resolving pneumonia. The procedure also allows for bronchoalveolar lavage (BAL), enabling cytological, microbiological, and pathological examinations that guide targeted treatment. Additionally, it facilitates the removal of mucus plugs or obstructive material, enhancing airway clearance and promoting the resolution of pneumonia(12)(13).

Overall, fiberoptic bronchoscopy is a valuable tool in the diagnostic and therapeutic management of non-resolving pneumonia, providing critical insights that aid in accurate diagnosis and effective treatment.Silver et al. identified tuberculosis as the cause of non-resolving pneumonia in 5.7% of cases through the culture of bronchoalveolar lavage (BAL) fluid (14)(15). Additionally, Balamugesh et al. reported that fiberoptic bronchoscopy (FOB) is a highly effective tool in the evaluation of non-resolving pneumonia (16).

CONCLUSION

Fiber-optic bronchoscopy emerges as a crucial diagnostic tool, contributing significantly to enhancing diagnostic accuracy in cases of non-resolving pneumonia.

DECLARATION

1) ETHICS APPROVAL AND CONSENT OF PARTICIPATION

Ethical committe approval is not taken as it is a case study which is an observational study.

2) CONSENT FOR PARTICIPATION

Consent was taken from the patient

3) DATA AND MATERIAL AVAILABILITY

The data and material for the case study has been obtained from hospital records.

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