



## Original Research Article

## Role of fiberoptic bronchoscopy in early diagnosis of non-resolving pneumonia

S. Praveena<sup>1</sup>, J.V. Praveen<sup>1</sup>, S Manoj Kumar<sup>2</sup>, K.V. Phani Madhavi<sup>3,\*</sup><sup>1</sup>Dept. of Pulmonary Medicine, Government Hospital for Chest and Communicable Diseases, Visakhapatnam, Andhra Pradesh.

Fax: India

<sup>2</sup>Dept. of Ophthalmology, Visakha Institute of Medical Sciences, Visakhapatnam, Andhra Pradesh, India<sup>3</sup>Dept. of Community Medicine, Government Medical College, Rajamahendravaram, Andhra Pradesh, India

## ARTICLE INFO

## Article history:

Received 10-03-2022

Accepted 24-06-2022

Available online 31-07-2023

## Keywords:

Fiberoptic bronchoscopy

Nonresolving pneumonia

Tuberculosis

Lung cancer

## ABSTRACT

**Introduction:** Non-resolving pneumonia are not so infrequent with a clinical scenario where multiple diagnostic modalities are required to arrive at a diagnosis. We aimed to assess the role of fiberoptic bronchoscopy in early diagnosis of non-resolving pneumonia.

**Materials and Methods:** This is a prospective observational study done in department of pulmonary medicine from January 2020 to December 2020. 90 cases of non-resolving pneumonia cases attending the department of pulmonary medicine, AMC were selected after applying inclusion and exclusion criteria. These cases were subjected to fiber optic bronchoscopy. BAL, bronchial brushings and washings were collected and analyzed.

**Results:** Among 90 cases of non-resolving pneumonia studied, 50 to 60 years age group were commonly affected accounting to 33%. Male predominance was observed with 73.3%. Smoking was common observation accounting to 51%. Bacterial pneumonias were found to be commonest etiology followed by tuberculosis, bronchogenic carcinoma and fungal infection accounting to 46.6%; 22.2%; 17.7%; 1.1% respectively. Diagnosis was indeterminate in 12.2% of cases.

**Conclusion:** Fiberoptic bronchoscopy is an excellent aid in diagnosis of non-resolving pneumonia thus enabling to differentiate bacterial pneumonias as well as fungal infection and pulmonary tuberculosis. It also helps to rule out bronchogenic carcinoma.

This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: [reprint@ipinnovative.com](mailto:reprint@ipinnovative.com)

## 1. Introduction

Non resolving pneumonia is defined as a clinical syndrome in which focal infiltrates begin with some clinical association of acute pulmonary infection and despite a minimum of 10 days of antibiotic therapy patient either don't improve or worsen (or) radiographic opacities fail to resolve within 12 weeks.<sup>1</sup> It has always been a challenge to diagnose a case of non-resolving pneumonia due to its wide spectrum of differential diagnosis and was very stressful on the patients' aspects as they need to go through wide range

of investigations.<sup>2</sup> Such patients may be at risk of delay in diagnosis which adversely affects their outcomes.<sup>1</sup> Delay in diagnosis increases the mortality by 3-5% in community acquired pneumonia and nosocomial pneumonia. Fiber optic bronchoscope is very useful which aids in early and accurate diagnosis of non-resolving pneumonia there by helping in differentiating pyogenic causes and also rule out bronchogenic carcinoma.<sup>3</sup>

\* Corresponding author.

E-mail address: [drmadhavikvp@gmail.com](mailto:drmadhavikvp@gmail.com) (K. V. P. Madhavi).

## 2. Materials and Methods

### 2.1. Objectives of the study

1. To study age and sex prevalence of non-resolving pneumonia.
2. To study bronchoscopic findings of non-resolving pneumonia.
3. To study aetiology of non-resolving pneumonia based on the BAL analysis, bronchial washings, bronchial brushing and bronchial biopsy.

### 2.2. Study design

This is a prospective observational study done in department of pulmonary medicine from January 2020 to December 2020

### 2.3. Study population

90 cases of non-resolving pneumonia cases attending the department of pulmonary medicine, AMC during the study period were selected after applying inclusion and exclusion criteria. These cases were subjected to fiberoptic bronchoscopy. BAL, bronchial brushings and washings were collected and analyzed.

### 2.4. Inclusion criteria

1. Pneumonia cases showing failure to resolution of radiological findings even after 2 weeks of antibiotic therapy.
2. Pneumonia cases with sputum CBNAAT negative and showing failure to resolution even after 2 weeks of antibiotic therapy.

### 2.5. Exclusion criteria

1. Pneumonia with sputum CBNAAT positive
2. Pneumonia cases with immunodeficiency eg: HIV.
3. Patients general condition fit for FOB
4. Patients unwilling for FOB.

### 2.6. Study protocol

The study was initiated after approval from the institutional ethics committee. After application of inclusion and exclusion criteria and taking prior informed consent, patients with clinical presentation suggestive of pneumonia i.e with fever >100 f, cough, expectoration, SOB, chest pain were included in the study. They are subjected to physical examination to check for pallor, cyanosis, clubbing, lymphadenopathy, icterus, vitals, History of other comorbid abnormalities were enquired. All the patients were subjected to routine blood investigation, blood urea, serum creatinine, LFT, sputum CBNAAT negative were selected after obtaining the consent for the procedure. FOB was done in all the cases and the findings

were recorded. Bronchial washings and bronchial biopsy were done. BAL was collected from the site of the lesion and also from other areas of segments and sent for analysis.

Analysis of results: After the study was completed, the clinical data was analyzed for all the 90 patients; observation and results were documented. Descriptive statistics like mean, standard deviation, standard error of mean were calculated to express the results.

## 3. Results

Among 90 cases of non-resolving pneumonia studied, 50 to 60 years age group were commonly affected accounting to 33%. Male predominance was observed with 73.3%. Smoking was common observation accounting to 51%. Pseudomonas was the commonest organism isolated in cases of non-resolving pneumonia followed by mycobacterial tuberculosis accounting for 23.3 and 22.2% of cases. Staphylococcus and klebsiella were noted in 10 and 13.3 % of cases respectively. Right lung involvement was noted in 63.3% of cases followed by left lung involvement in 36.7% of cases. Bilateral lobar involvement was noted in 13(14.4%). Right upper lobe was the commonest site affected accounting for 46.7% of cases followed by left lobe involvement and bilateral involvement with 38.95 and 14.4 % respectively. Bacterial pneumonias were found to be commonest aetiology followed by tuberculosis, bronchogenic carcinoma and fungal infection accounting to 46.6%; 22.2%; 17.7%; 1.1% respectively. Diagnosis was indeterminate in 12.2% of cases.

**Table 1:** Distribution of cases based on bronchoscopic findings

Bronchoscopic findings	Number of cases	Percentage of cases
Mucosal inflammation	22	24.4 %
Intraluminal mass lesion	12	13.3%
Purulent secretions	31	34.4%
Crypts congestion	4	4.4%
Total	21	23.3%
Total	90	

**Table 2:** Distribution of cases based on aetiology

Aetiology	Number of cases	Percentage of cases
Bacterial	42	46%
Fungal	1	1%
Mycobacterial	20	22.2%
Bronchogenic carcinoma	16	17.8%
undiagnosed	11	12.2%
Total	90	

**Table 3:** Distribution of cases based on age distribution

Age	Number of cases	Percentage of cases
<20	3	3.4%
21 – 30	6	6.5%
31 –40	12	13.4%
41 – 50	27	30%
51 – 60	30	33.3%
61 – 70	6	6.7%
>70	6	6.7%

**Table 4:** Distribution of cases based on gender distribution

Gender	Number of cases	Percentage of cases
Males	66	72.3%
Females	24	26.7%

**Table 5:** Distribution of cases based on site of lesion

Site of lesion	Number of cases	Percentage of cases
Right	42	46.7%
Left	35	38.9%
Bilateral	13	14.4%

**Table 6:** Distribution of cases based on causative organism

	Number of cases	Percentage of cases
Pseudomonas	21	23.3
Staphylococcus	9	10.0
Klebsiella	12	13.3

#### 4. Discussion

Non resolving pneumonia is not an infrequent problem faced by practicing pulmonologist.<sup>4</sup> Radiological resolution lags behind the clinical signs in most of the pulmonary infections. When that is not the case, other etiologies should be sought, which include unusual organisms like mycobacteria, higher order bacteria and fungi.<sup>4</sup> Noninfectious causes that could be causing the delayed resolution are neoplastic disease, immunologic disease, thromboemboli, and inhalation injuries.

Chalmers et al.<sup>5</sup> reported that by 3<sup>rd</sup> day if clinical improvement is not attained then the diagnosis should be reevaluated. Physical examination and important blood investigations like CRP should be done. When microbiological investigations and blood sampling investigations are not informative then bronchoscopy is a good diagnostic tool especially when multidrug resistant microbes and endobronchial lung cancers are present. Bronchoscopy and bronchoalveolar lavage should be done in such patients.

BAL performed without protected catheters may be contaminated, but there is no evidence that protected BAL

is more reliable than conventional BAL. BAL can be done safely and rapidly for diagnosing lower respiratory infections. So the Aim of this study is to evaluate the important role of bronchoscopy and BAL in arriving at a diagnosis in patients with non-resolving pneumonia.

Non Resolving Pneumonia accounts for 15% of pneumonia cases and 8% of bronchoscopies. There are a wide variety of reasons for slow resolution of pneumonia including host factors, etiology, complications following pneumonia etc. non-infectious causes etc. aggravating 20% of non resolving pneumonia cases non-infectious. In this study the clinical, radiological profile of non-resolving pneumonia is studied along with bronchoscopic findings and etiological diagnosis also delineated.

In our study non resolving pneumonia is common in 50-60 years age group accounting to 33% followed by 40-50 years age group with 30%. But in the study done by Mohammed et al. Shabrawy et al. showing a mean age of 47.6± 12.2 years. Our study coincided with study done by Arunobhai Datta Choudary et al. accounting to 57.33%± 1.71 years of mean age. This is being further supported by study done by Ramesh P M et al. showing non resolving pneumonia more common in 57-60 years age group.

Male predominance is noted in our study showing 72.3% and female accounting to 26.7%. Male preponderance is observed in studies done by Mohamed el Shabrawy et al., Arunabha et al., Rane et al. accounting to 66%, 65%, 80% respectively.

Cough is the predominant symptom followed by the expectoration, shortness of breath. Right upper lobe is the commonest site of non-resolving pneumonia 46.7% of cases showed right lung involvement followed by 38.9% left lung involvement. Bilateral lung involvement is noted in 14.4% of cases. In the study done by Mohamed el Shabrawy et al. right upper lobe is the predominant site accounting to 25.9%. The same was revealed in study done by Arunabha Datta Chaudhrani et al. accounting to 25% and right lung involvement is seen in 65% of cases.

Among the bronchogenic findings; purulent secretions is mostly observed in 31 cases accounting to 34.4% of cases followed by mucosal inflammation in 24.4% of cases. In the study done by MD Majeed Pasha et al., mucosal inflammation and purulent secretions are the commonest findings and purulent secretions are the commonest findings observed in 56.25% of cases.

Fungal pneumonia are same but one case of mucormycosis was noted in our study. In study done by Rajesh et al. fungal pneumonia were observed in 3 cases accounting to 5%. Bronchogenic carcinoma was one of the causes of non-resolving pneumonia. 17.8% of cases were noted in our study. The same was observed by study done by Mohammed el al. accounting for 13.3% and 26.7% in study done by Arunabha et al.<sup>1</sup> followed by 24.4% in study done by Ramesh et al. Malignant causes were seen in 10%

of each in Rajesh et al.

In our study bacterial etiology is commonly observed in 46% of cases among the bacterial causes pseudomonas is the commonest micro organisms involved in NRP to 26.3% of cases. NRP followed by klebsiella and staphylococcus with 13.3% and 10% of total NRP cases respectively. In the study done by Mohammed el shabrawy et al bacterial pneumonia are the commonest aetiology accounting to 83.7% with BAL gramstain sample positive in 65.4% of cases. Pyogenic organism were isolated in 113 patients with 83.7% by BAL culture.

Similarly pyogenic infection was common aetiology with 53.3% in study done by arunabha et al. our study coincides with study done by Ramesh et al. bacterial pneumonia are more common accounting to 42.2%.

Tuberculoma is the second most common cause next to bacterial infection in our study accounting to 22.2%. The same is the scenario in study done by Ramesh et al with 26.77%, 28.8% respectively. But in study done by mohammed et al tuberculosis was observed only in 2.96%. In study done by Rajesh et al tb is seen in 66.67%.

## 5. Conclusion

Fiberoptic bronchoscopy is an excellent aid in diagnosis of non-resolving pneumonia thus enabling to differentiate bacterial pneumonias as well as fungal infection and pulmonary tuberculosis. It also helps to rule out bronchogenic carcinoma.

## 6. Limitations

The study sample being small is inadequate to calculate the exact yield of FOB in NRP. Fob in noninfectious causes can't be evaluated further due to lack of further investigations example wegener's granulomatosis. TB being endemic in India, FOB gives a higher yield in diagnosis of endobronchial tuberculosis.

## 7. Conflict of Interest

There are no conflicts of interest in this article.

## 8. Source of Funding

None.

## References

1. Chaudhuri A, Mukherjee S, Nandi S, Bhuniya S, Tapadar SR, Saha M, et al. A study on non-resolving pneumonia with special reference to role of fiberoptic bronchoscopy. *Lung India*. 2013;30(1):27–32. doi:10.4103/0970-2113.106130.
2. Rome L, Murali G, Lippmann M. Non-resolving pneumonia and mimics of pneumonia. *Med Clin North Am*. 2001;85(6):1511–30. doi:10.1016/s0025-7125(05)70393-x.
3. Balakrishnan RK, Mishra G, Ghorpade SV. Role of Fiberoptic Bronchoscopy in Non-Resolving Pneumonia. *National J Med Res*. 2016;6(4):316–20.
4. Jiménez P, Saldías F, Meneses M, Silva ME, Wilson MG, Otth L, et al. Diagnostic fiberoptic bronchoscopy in patients with community-acquired pneumonia. *Chest J*. 1993;103(4):1023–7. doi:10.1378/chest.103.4.1023.
5. Chalmers JD, Mandal P, Singanayagam A. Severity assessment tools to guide ICU admission in community-acquired pneumonia: systematic review and meta-analysis. *Intensive Care Med*. 2011;37(9):1409–20.

## Author biography

**S. Praveena**, Associate Professor  <https://orcid.org/0000-0002-3931-1805>

**J.V. Praveen**, Assistant Professor

**S Manoj Kumar**, Civil Assistant Surgeon

**K.V. Phani Madhavi**, Associate Professor

**Cite this article:** Praveena S, Praveen JV, Kumar SM, Madhavi KVP. Role of fiberoptic bronchoscopy in early diagnosis of non-resolving pneumonia. *Panacea J Med Sci* 2023;13(2):423-426.