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Original Research Article

A clinical study on non-resolving pneumonia in tertiary care centre

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ABSTRACT

Background: Non-resolving pneumonia is a problem not only for the patient but also to the treating physician because establishing the cause for the non-resolution of pneumonia takes time and requires invasive investigations. The present study was done with the aim to evaluate the etiology and clinical outcome of non-resolving pneumonia by using fibre-optic bronchoscopy (FOB).
Methods: This prospective study was done on 45 patients with symptoms and signs of non-resolving pneumonia attending the Government Thiruvotteeswarar Hospital of Thoracic Medicine, Otteri, Chennai, a tertiary care teaching centre, during the period January 2016 to December 2016. All the patients were investigated systematically to find out the etiological factors for non-resolution pneumonia
Results: Males preponderance was seen in the study (80%). Patients of age group 51-60 years are more affected (26.6%). Bacterial pneumonia not responding to empirical antibiotics (42.2%) was the most common cause followed by pulmonary tuberculosis (28.8%) and malignancy (24.4%). On FOB, inflammation with secretions was noticed in most of the patients (66.6%).
Conclusions: The findings of the study concluded that apart from bacterial pneumonia not responding to empirical antibiotics, tuberculosis and malignancy were found to be the major causes of non-resolving pneumonia. Hence, it is necessary to observe every patient for the adequate response to treatment and to utilize other modalities of investigations like FOB, CT guided FNAC/biopsy whenever required to offer exact management to the patients.

Keywords: Etiology, Fibre-optic bronchoscopy, Non-resolving pneumonia

INTRODUCTION

Community acquired pneumonia in adults is an important cause of morbidity and mortality all over the world.[1] Often the diagnosis is made on the basis of clinical features alone, although radiographic demonstration of consolidation of one or more segments or lobes of the lung remains the gold standard. It is often difficult to establish the specific infectious etiology in a given patient so that empirical antibiotic therapy is usually undertaken. Most of the patients with community acquired pneumonia respond quickly to initial empiric antibiotic therapy and follow an uncomplicated course, but small proportion of patients fail to respond to initial therapy and require additional investigations and treatment.

Non-resolving or slowly resolving pneumonia is not uncommon, affecting 10-20% of patients admitted with community acquired pneumonia (CAP).[2] Normal resolution of pneumonia can vary depending upon the host immune status and the infecting organisms. There is no clear-cut definition for resolution as well as non-resolution of pneumonia.

Multiple factors have been implicated in the etiology of non-resolving pneumonia including advanced age,

smoking, alcoholism, host immunity, virulence and microbial resistance of infecting organisms, underlying lung diseases and comorbidities like diabetes mellitus, HIV infection and other diseases mimicking pneumonia like tumors and non-infectious causes.[3]

Contrast enhanced CT chest and fibre-optic bronchoscopy (FOB) plays a major role in the evaluation of the non-resolving pneumonia. In some studies, FOB may aid in etiological diagnosis by around 80%.

In the present study, we tried to establish the role of FOB in achieving the diagnosis of etiology of non-resolving pneumonia.

METHODS

Study design

This study was a prospective cross-sectional study conducted on 45 patients attending Government Thiruvotteeswarar Hospital of Thoracic Medicine, Otteri, Chennai, a tertiary care teaching centre over a period of one year from January 2016 to December 2016.

Inclusion criteria

Adult male and female patients of non-resolving pneumonia with symptoms and signs (cough, sputum production, with or without fever >100^{0}F) and with a chest X-ray report showing <50% resolution after 2 weeks of antibiotic therapy or less than complete clearance at 4 weeks in spite of antibiotic therapy for minimum period of 10 days.

Exclusion criteria

Patients of age <18 years, known case of pulmonary TB (sputum smear, sputum culture, Gene Xpert positive for MTB), known case of lung malignancy, HIV infection and poor general condition and non-willing patients were excluded from our study.

Study protocol

After getting approval from institutional ethical committee, complete demographic and clinical history (age, sex, smoking, alcoholism, diabetes, cough, expectoration, fever, shortness of breath, chest pain, hemoptysis and wheeze) and detailed clinical examination were done to all the patients. Routine investigations like complete blood count, blood sugar, urea, creatinine, sputum for microbiological tests (AFB smear, gram stain, pyogenic culture and sensitivity, fungal smear and culture and sensitivity) and chest X-ray were done. Repeat chest X-ray was taken after 2 weeks of empirical antibiotic. CECT chest was done in necessary patients. FOB was done in all patients, by which macroscopic appearance of trachea-bronchial tree noted. Bronchial wash, brush, biopsy was done whenever applicable. Samples were sent for microbiological analysis (AFB smear, gram stain, pyogenic culture and sensitivity, fungal smear and culture and sensitivity and cytological analysis to look for malignancy whenever necessary. CT guided FNAC was done in selected cases. Informed consents were taken from all the subjects.

All the values are expressed in number and percentages by using Microsoft Excel.

RESULTS

45 patients were enrolled in our study during the one-year period. Among them, 36 patients were male (80%) and 9 patients were female (20%). Mean age of distribution is 45 years. 64% (29 patients) were above 40 years of age. Age wise distribution is given in Table 1. Mean duration of symptoms was 21.08 days. 21 patients were smokers (46.66%) and 8 patients (17.77%) were alcoholic, all of them were male patients. Diabetes was diagnosed in 17 patients (37.77%). Among the 17 diabetics, 12 patients were male, remaining 5 were female.

Table 1: Demographic characters of study population.

Demographic characters	No. of patients (n=45) (%)
Age (in years)	
<20	5 (11.11)
21-30	5 (11.11)
31-40	6 (13.3)
41-50	11 (24.4)
51-60	12 (26.6)
>60	6 (13.3)
Sex	
Male	36 (80)
Female	9 (20)

Table 2: Signs and symptoms observed in study population.

Signs and symptoms	No. of patients (%)
Signs: Chest X-ray	
Consolidation	38 (84)
Consolidation with cavities	5 (11)
Only cavity	2 (4)
Signs: CT chest	
Mediastinal adenopathy	11 (28)
Pleural effusion	5 (13)
Collapse	2 (5)
Symptoms	
Cough	44 (98)
Fever	38 (84)
Hemoptysis	18 (40)
Shortness of breath	24 (55)
Constitutional symptoms	20 (44)
Palpable lymph node	7 (17)
Clubbing	10 (22)

X-ray chest revealed consolidation in 38 (84%), patients, consolidation with cavities in 5 (11%) patients, only cavity in 2 patients (4%). Right lung involvement occurred in 22 patients (49%), left lung involvement in 15 patients (33%) and bilateral involvement in (18%) 8 patients.

In CT chest, 38 patients with consolidation pattern on X-ray chest, showed additional findings like mediastinal adenopathy in 11 patients (28%), pleural effusion in 5 patients (13%) and collapse in 2 patients (5%). Most of the patients presented with cough (98%), fever (84%), hemoptysis (40%), shortness of breath (55%), constitutional symptoms (44%), palpable lymph node (17%) and clubbing (22%) (Table 2).

Table 3: Diagnostic results.

Diagnosis	No. of patients (%)
Bacterial pneumonia not responding to empirical antibiotics	19 (42.2)
Pulmonary tuberculosis	13 (28.8)
Malignancy	11 (24.4)
Sarcoidosis	1 (2.2)
Mucoid impaction	1 (2.2)

In this study, as in given in Table 3, pneumonia not responding to empirical antibiotics was diagnosed in 19 patients (42%), pulmonary tuberculosis in 13 patients (29%), malignancy in 11 patients (24%), mucus impaction in 1 patient and sarcoidosis in 1 patient.

Among 19 patients with pneumonia not responding to empirical antibiotics, *Klebsiella* was isolated in 12 patients, *Staphylococcus* in 2 patients, *Pseudomonas* in 2 patients, *Streptococcus* in 1 patient and fungal infection in 2 patients. Among these, 12 patients had diabetes as the risk factor, 8 patients had smoking as a risk factor.

Table 4: Organisms isolated in bacterial pneumonia cases (n = 19).

Organisms isolated	No of patients (%)
Klebsiella	12 (63.15)
Staphylococcus	2 (10.5)
Pseudomonas	2 (10.5)
Streptococcus	1 (5.2)
Fungal infection	2 (10.5)

Pulmonary tuberculosis was the etiology in 13 patients. All of them were diagnosed by bronchial wash positive for Gene Xpert, 8 patients had bronchial wash for AFB smear positive, 1 patient biopsy showed organism. Malignancy was diagnosed in 11 patients, out of which 6 patients had squamous cell carcinoma, 2 patients had adenocarcinoma, 3 patients had smear suspicious for malignancy. Those 3 patients were subjected to CT guided fine needle aspiration which confirmed the malignancy as adenocarcinoma. Among these 11 patients, 9 of them had smoking as risk factor.

Table 5: FOB findings in study participants.

FOB findings	No. of patients
Inflammation with secretions	30 (66.6)
Only inflammation	8 (17.7)
Intraluminal growth	6 (13.3)
Mucoid impaction	1 (2.2)

FOB was done in all patients. As shown in Table 5, inflammation with secretions was noticed in most of the patients (66.6%).

DISCUSSION

Multiple risk factors are implicated in non-resolution. Most of them are related with an impairment of the efficacy of host immune defence.[4] Aging is one of the significant risk factor among them.[5] In Jayaprakash et al study, 84.6% of patients are above 40 years old and in Chaudhuri et al study, 80% are above 40 years old.[6,7] In our study 64% (29) are above 40 years. El Solh et al stated that, age alone is an independent risk factor for non-resolution of pneumonia. In their study, chest X-ray clearance was found to be 35.1% by 3 weeks and 60.2% by 6 weeks in patients above 70 years old.[8]

Many studies identified smoking is the other common risk factor next to age. Smoking was the commonest risk factor found in our study (n=21). Among them, 9 patients had malignancy and 8 patients had community acquired pneumonia not responding to empirical antibiotics. Jayaprakash et al, stated that smoking was the most common comorbidity noted in his study.[6]

Some studies validated that male patients of certain racial or ethnic groups are be at greater risk of pneumonia.[9] This was in corroboration with the findings of our study in which males (n=36) were more affected than females (n=9). Diabetes was the next common comorbidity noted in our study (37.77%). Similar findings was also done by Chathamparamb et al. In his study, diabetes was found to be the most common cause of non-resolving pneumonia (39.8%).[10]

Klebsiella was isolated in 12 patients, *Staphylococcus* in 2 patients, *Pseudomonas* in 2 patients, and *Streptococcus* in 1 patient. In Chaudhuri et al study, diabetes was the next common comorbidity identified in 33.3%.[7] Begamy study had also reported *Klebsiella* as the commonest organism in diabetics with pneumonia.[11] In the present study, predominant symptom was cough, found in 44 (98%) patients, followed by fever (86.44%), hemoptysis 40% and shortness of breath (55.55%). Hemoptysis and chest pain were the predominant symptom found in lung malignancy. Chaudhuri et al study showed cough was 100%, followed by fever 96.6%, hemoptysis 53.5%, chest pain 38.5% and shortness of breath in 33.3%.[7] In the

present study, right lung was involved in 22 patients, left lung in 15 patients and bilateral involvement in 8 patients. Bilateral involvement was commonly seen in tuberculosis and community acquired pneumonias. Bilateral multilobar involvement was commonly seen in tuberculosis patients.

The major causes of non-resolving pneumonia found in our study, were *Klebsiella pneumonia*, tuberculosis and malignancy. Other less common causes were pneumonia due to *Pseudomonas*, *Staphylococcus*, fungal infection and *Streptococci*. In Jayapraksh et al study, causes were tuberculosis 25.7%, malignancy 27.7%, bronchiectasis 8.6%, pneumonia resistant to empirical antibiotics 14.3% (mainly due to *Klebsiella* and *Pseudomonas* infections).[6] In our study tuberculosis was seen in 13 (28.8%) cases. Studies by Chaudhuri et al and Feinsilver contributed to 16.7% cases 5.7% of tuberculosis cases respectively.[7,12]

In the present study, malignancy was identified in 11 patients in whom most of them had squamous cell carcinoma. This was in accordance with the findings of Chathamparamb et al.[6]

CONCLUSION

Non-resolving pneumonia is a problem not only for the patient but also to the treating physician because establishing the cause for the non-resolution of pneumonia takes time and requires invasive investigations. Apart from community acquired pneumonia not responding to empirical antibiotics, tuberculosis and malignancy contributes major cause for non-resolution.

Age itself is an important risk factor apart from smoking, diabetes and alcoholism. It is very much needed to observe every patients for the adequate response to treatment and to utilize other modalities of investigations like FOB, CT guided FNAC/biopsy whenever required when there is non-resolution of pneumonia so that the cause for non-resolution can be found out and managed.

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