

Clinico-radiological profile of bronchiectasis patients an observational study

DR.P.Niranjan Prabhakar¹, Dr.V.Sriandaal², Dr. Basanta Hazarika³

¹Assistant Professor Pulmonology, ²Assistant Professor Community Medicine, ³Professor Pulmonology
Department of Pulmonology,
Velammal Medical College Hospital and Research Institute, Madurai, Tamilnadu, India

Abstract

Introduction: Bronchiectasis is a progressive, obstructive lung disease that results from the presence of chronic inflammatory secretions and microbes leading to the permanent dilation and distortion of airway walls. Continuous cough followed by shortness of breath will cause reduced quality of life among the patients. Despite so many techniques, etiology remains undetermined. Diagnosis of bronchiectasis relies on clinical suspicion. Hence this study is for performed to demonstrate the clinical and radiological profile of bronchiectasis patients.

Aim: To study the clinical and radiological profile of bronchiectasis and to assess the microbiological profile of bronchiectasis patients

Materials and methods: This was a hospital- based observational study conducted in the Department of Pulmonary Medicine in Gauhati Medical College and hospital, Guwahati. The present study was conducted from 1st August 2018 to 30th July 2019. All patients more than 14 years of age, with radiologically diagnosed bronchiectasis and willing to participate in the study were included. Demographic details of the patients were collected using a semi- structured questionnaire. Analytical tests were performed using Pearson correlation and Chi-square test.

Results: A total number of 127 bronchiectasis patients who meet the inclusion criteria were included in the study. The mean age of the patients was 49.47 ± 9.44 years. Common Etiology was idiopathic 54(42.51%) followed by history of antitubercular treatment 45 (35.43%). The most common radiological type of bronchiectasis was cylindrical 79 (62.20%) followed by cystic 36 (28.34%). Pseudomonas was the most common organism seen in 27 (21.25%) of the sputum cultures of bronchiectasis patients. Pseudomonas had a clinically and statistically significant association with cystic type of bronchiectasis with a p value of 0.0004.

Conclusion: In this study Idiopathic etiology is the common cause of Bronchiectasis. Obstructive pattern of spirometry is found in majority. Pseudomonas is the common pathogen.

Keywords: Etiology, Sputum culture, Spirometry

Introduction:

Bronchiectasis is an obstructive lung disease that results from the presence of chronic inflammatory secretions and microbes leading to the permanent dilation and distortion of airway walls (1) This may lead to recurrent lower respiratory tract infections, worsening pulmonary functions, respiratory failure and pulmonary hypertension, resulting in deterioration in quality of life, with increased morbidity and premature mortality. The word bronchiectasis is derived from Greek words, *bronchion* meaning windpipe and *ektasis* is stretching out. The etiology of bronchiectasis varies in different populations. Immune deficiency syndromes, metabolic and ultra-structural defects are the predominant etiologic factors in developed countries, while bacterial and viral infections continue to be major causes of the disease in developing countries (2) On the other hand, despite using advanced immunological and genetic diagnostic techniques, etiology in 40% of cases remains undetermined (3)

The diagnosis of bronchiectasis initially relies on clinical suspicion. More than 90% of patients had persistent cough and almost three-quarters describe daily expectoration of yellowish green purulent sputum. (1) The diagnosis of bronchiectasis is confirmed radiologically using high resolution computed tomography (HRCT) of the chest. It has become increasingly recognised that treatments for bronchiectasis cannot be extrapolated from other chronic respiratory diseases and more studies are needed to better understand disease pathogenesis and to establish an optimum approach to the management of this debilitating disease. There are very few studies done on bronchiectasis in India and as per my knowledge no study is reported from Guwahati, a north eastern city of the country. The present study was therefore planned to analyze the clinical ,radiological and microbiological spectrum of bronchiectasis in Guwahati, a north eastern city of the country. Our aim of the study was to find out common presenting symptoms, clinical signs, Chest X ray findings, HRCT Thorax patterns, Spirometry patterns, microbiological profile and common etiologies of bronchiectasis in North Eastern region of India. This was a hospital based study done in Guwahati medical College & Hospital, a tertiary care hospital where patients come from different parts of north eastern region of India.

Materials and Methods:

Study subjects and study design

This study was a hospital based prospective observational study done in the department of pulmonary medicine, Internal Medicine and allied specialities in Gauhati medical College & Hospital, a north East Indian hospital. . Through simple random sampling

around 127 cases who attended the OPD from August 2018 to July 2019 were taken up for study. Written informed consent from the patients was taken. Ethical clearance (190/2007/pt-1/IEC/41) was obtained from Ethical committee of the institution prior to the onset of study.

Inclusion criteria: All patients more than 14 years of age with tram track appearance and with increased bronchovascular markings in chest X-ray were included. Patients with co-morbidities like carcinoma and pregnant patients were excluded from the study.

Data collection

A preformed questionnaire was used to collect information regarding the demographic data, childhood history, symptomatology, and significant past and personal history. Chest radiograph, and high-resolution computed tomography (HRCT) chest was done to assess the radiological involvement. Sputum acid fast bacilli (AFB), bacterial culture and sensitivity was done to assess the microbiological colonisation. Bronchoscopy was done in selected patients and bronchoalveolar lavage was collected and subjected to AFB, bacterial culture and sensitivity were done as and when indicated. Spirometry with bronchodilator reversibility was done for airway assessment.

Radiological diagnosis

Chest radiograph (postero-anterior view) was done in all patients, preferably in the standing position. The patients were advised to hold their breath for a few seconds. HRCT (FOV 35 cm, matrix size 768 * 768).

Spirometry

In spirometry flow-volume loop, FEV1 and FVC were recorded. The pattern of spirometry was classified into normal, obstructive, restrictive, and mixed types. Normal spirometry was defined as when the expiratory flow-volume loop had a triangular shape with its top at the left. The inspiratory part of the loop is shaped like a semi circle. The values of the parameters were higher than 80% of the predicted values, while the tiffeneau index ($FEV1/FVC*100$) was higher than 70. In Obstructive Lung Disease the tiffeneau index is below 70 and an indented or concave expiratory part of the flow-volume loop is found. When obstructive lung disease was present, often a post-medication test was performed after administration of a bronchodilator.

Statistical analysis

Statistical analysis was done using the Microsoft Excel and SPSS software. The chi-square (χ^2) test of independence was used to test for a statistically significant relationship between two categorical variables. P value ≤ 0.05 , it was considered statistically significant. Pearson correlation was used to assess the strength of correlation between variables. The data were analyzed in tabular form, bar diagrams and pie diagrams as and where indicated.

Results:

This study had 127 patients with bronchiectasis. Among them 48.81% were seen in the age group of 46 to 55 years followed by 19.68% cases in the age group of 36 to 45 years. The highest age of the patient in the study was 69 years. The mean age of the patients was 49.47 ± 9.44 years. Overall, 56.69% cases of the study population were females and 43.31% cases were males. The female to male ratio was 1.30:1.0. The most common presenting complaint was cough with expectoration (50.39%). Fever was the presenting complaint in 6.29% of cases whereas chest pain in 1.57%. In this study 62.99% of the cases were non-smokers. Overall, 42.51% cases did not have any significant respiratory illness in the past (table 1).

The obstructive pattern was most commonly found in spirometry (43.3%) (table 2).

Interpret table 3 to find the most common pattern in Spirometry and HRCT.

Sputum microscopy for AFB was positive in 3.15% of cases. The most common microorganism isolated in sputum culture was *Pseudomonas aeruginosa* in 21.25%. Out of 27 patients with *Pseudomonas* infection majority had cystic bronchiectasis. The association between the spirometric pattern and involvement of microorganism was significant for *Pseudomonas* and *Haemophilus influenzae* (table 4).

No significant association was found among the spirometry pattern and the gender.

Discussion:

This study was carried out with the aim of assessing clinical, radiological and microbiological profile in bronchiectasis patients. Most significant observations and conclusions hence derived upon from this present study were in conformity with available literature on the subject.

Table 1- comparison of our study findings with other study findings.

characteristics	Our study	Other studies
Mean age	49.47 ± 9.44 years	58 years- Angrill JC et al 2002 (4) 57 ± 14years- king PT et al 2006 (5) 56 years- Habesoglu MA et al 2016 (6)
Smokers	19.68%	62.92% - Devi L et al 2018 (7)
Idiopathic etiology	42.51%	26.06%- Shoemark A et al 2007(8) 66%- Qi.Q,Wang et al 2015 (9)
Bilateral lower lobe involvement in chest radiography	23.62%	80 %- King PT et al 2006 (5)
Right side lesion in HRCT	48.81%	86%-Lynch DA et al 1999 (11)
AFB smear positive	3.15 %	3%- Bopaka RG et al 2015 (12)
Common organism isolated in sputum culture	P. aeruginosa 21%	H.influenza- lee JH et al 2004 (10)

In comparison it clearly states more incidence of bronchiectasis occur in late 40s. majority of patients visit physician with the complaints of Cough with purulent expectoration similarity was noted by Habesoglu MA et al (6) hence cough with prolonged duration should be suspicious of bronchiectasis. Among the spirometry pattern 43.3% had Obstructive pattern, this is due to airway inflammation and stasis of secretions, which are common in patients with bronchiectasis. Over use or inappropriate prescription of oral antibiotics without anti-pseudomonal activity could explain the predominance of P.aeruginosa in this study. Patients with cystic disease had a greater degree of functional impairment, compared to other types. This is in accordance with our study.

Limitation(s):

This study is subject to selection bias, since patients were selected from the inpatients of a single tertiary hospital. Therefore, the results might not represent the general population, probably including less severe or asymptomatic cases.

Conclusion:

Bronchiectasis might be one of the ongoing important reasons of mortality and morbidity, with worsening quality of life in that region. Commonly presenting by middle age the condition has typical symptoms and clinical findings. Postinfective causes such as pneumonia and tuberculosis appear to be the predominant etiology leading to bronchiectasis. This diagnosis should be actively considered in patients with a history of chronic cough with expectoration with or without hemoptysis, and/or breathlessness.

References

1. AF B. Bronchiectasis. N Engl J Med. 2002;346:1383–93.
2. Cobanoglu U, Yalcinkaya I, Er M, Isik AF, Sayir F MD. Surgery for bronchiectasis: The effect of morphological types to prognosis. Ann Thorac Med. 2011;Jan(6(1):25).
3. Pasteur MC, Bilton D HA. British Thoracic Society guideline for non-CF bronchiectasis. Thorax. 2010;Jul(1;65(Suppl 1):i1-58.).
4. Angrill JC, Agusti C, De Celis R, Rano A, Gonzalez J, Sole T, Xaubet A, Rodriguez-Roisin R TA. Bacterial colonisation in patients with bronchiectasis: microbiological pattern and risk factors. Thorax. 2002;Jan 1;57(1).
5. King PT, Holdsworth SR, Freezer NJ, Villanueva E, Holmes PW. Characterisation of the onset and presenting clinical features of adult bronchiectasis. Respir Med. 2006;100:2183–9.
6. Habesoglu MA, Ugurlu AO, Eyuboglu FO. evaluation of 304 patients with bronchiectasis. Ann Thorac Med. 2016;6(3):131–6.
7. Devi L, Garg R, Kumar A, Kushwaha RAS, Kumar S. An Insight into Bronchiectasis : Causes , Clinical Features , and Treatment Practices. Indian J Respir Care. 2020;9(2,July-December 2020):178–82.
8. Shoemark, A., L. Ozerovitch and RW. Aetiology in adult patients with bronchiectasis. Respir Med. 2007;101(6):1163–70.
9. Qi Q, Wang W, Li T, Zhang Y LY. Aetiology and clinical characteristics of patients with bronchiectasis in a Chinese population: A prospective study. Respirology. 2015;Aug;20(6):917–24.
10. Lee J-H, Kim Y-K, Kwag H-J CJ-H. Relationships between high-resolution computed tomography, lung function and bacteriology in stable bronchiectasis. J Korean Med Sci. 2004;Feb;19(1):62–8.
11. Lynch DA, Newell J, Hale V, Dyer D, Corkery K, Fox NL et al. Correlation of CT findings with clinical evaluations in 261 patients with symptomatic bronchiectasis. AJR Am J Roentgenol. 1999;jul(173(1)):53–8.
12. Bopaka RG, El Khattabi W, Janah H, Jabri H AH. Bronchiectasis: a bacteriological profile. Pan Afr Med J. 2015;22(1).

Table 1- Age & Gender Wise Distribution of Study Subjects (N-127)

AGE CATEGORY (IN YEARS)	NUMBER OF PATIENTS (%)
14-25	2 (1.57 %)
26-35	11 (8.66%)
36-45	25 (19.68%)
46-55	62 (48.81%)
56-65	23 (18.11%)
>65	4 (3.14%)
Gender	
Male	55 (43.31%)
Female	72 (56.69%)

Table 2-Etiology For Bronchitis (N-127)

ETIOLOGY	NUMBER OF PATIENTS (%)
Pneumonia	10 (7.87%)
ABPA	3 (2.36%)
RRTI	12 (9.44%)
Idiopathic	54 (42.51%)
Tuberculosis	45 (35.43%)
Viral exanthem	4 (3.14%)

ABPA-Allergic Bronchopulmonary Aspergillosis, RRTI- Recurrent Lower Respiratory Tract Infections

Table 3-Spirometry & Radiological Pattern In Study Population (N-127)

SPIROMETRY	NUMBER OF PATIENTS (%)
Normal	52 (40.94%)
Obstructive	55 (43.30%)
Restrictive	3 (2.36%)
Mixed	17 (13.38%)
HIGH RESOLUTION CT	
CYSTIC	36 (28.34%)
CYLINDRICAL	79 (62.20%)
VARICOSE	2 (1.57%)
MIXED	10 (7.87%)

Table 4- Association Between Sputum Culture And Radiological Types Of Bronchiectasis In Study Patients

SPUTUM CULTURE	Number of patients	Cystic	Cylindrical	varicose	Mixed	p-value (Chi square test)
Pseudomonas aeruginosa	27 (21.25 %)	14	8	0	5	0.0004 (<0.05)
Hemophilus influenza	15 (11.81%)	1	13	1	0	0.0352 (<0.05)
Fungal hyphae	3 (2.36%)	3	0	0	0	0.0511 (>0.05)
Acinetobacter baumannii	5 (3.93%)	1	3	0	1	0.7564 (>0.05)
Eschericia coli	17 (13.38%)	1	12	1	3	0.0383 (<0.05)
Klebsiella pneumonia	17 (13.38%)	8	9	0	0	0.2079 (>0.05)
Mycobacterium abscessus	1 (0.78%)	1	0	0	0	0.4667 (>0.05)
Mycobacterium tuberculosis	3 (2.36%)	1	2	0	0	0.9549 (>0.05)
Streptococcus pneumonia	15 (11.81%)	5	9	0	1	0.9272 (>0.05)
Staphylococcus aureus	10 (7.87%)	1	9	0	0	0.3003 (>0.05)
Negative	14 (11.02%)	0	14	0	0	0.0227 (<0.05)