

**“A STUDY OF CORRELATION BETWEEN CLINICAL FEATURES, RADIOLOGICAL FINDINGS AND SPIROMETRY PARAMETERS IN PATIENTS OF BRONCHIECTASIS”****Respiratory Medicine****Dr. Naiya J Bhavsar**

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ABSTRACT

INTRODUCTION: Bronchiectasis is defined as an irreversible dilation and destruction of one or more bronchi with a reduction in clearance of secretions and in the expiratory airflow. Etiologies include prior lung infection, systemic inflammatory disorders, and genetic disorders of host defense.

METHODOLOGY: This is an Observational study of 160 patients patient who were diagnosed with Bronchiectasis in tertiary health care centre over a period of 15 months. Data was collected and analyzed for correlation between clinical features, radiological findings and spirometry parameters.

RESULT: Mean age of presentation was 21-30 years. Most important etiology was post-infections, pulmonary tuberculosis followed by pneumonia. The cardinal symptoms of bronchiectasis were productive cough followed by dyspnoea on exertion. The most common bacteria isolated from sputum culture was Haemophilus Influenzae. The commonest radiological pattern of bronchiectasis was cylindrical followed by cystic and varicose. Most of the patients had obstructive pattern in spirometry tests.

CONCLUSION: Radiological findings and spirometry test are more valuable for early and accurate diagnosis of bronchiectasis which help in early and prompt management. Cases of bronchiectasis have repeated history of admissions in the hospital thus all options of treatment including surgical intervention must be taken into consideration for good quality life and healthy.

KEYWORDS

Spirometry, Bronchiectasis, Tuberculosis, Pneumonia, Pulmonary Function Test

INTRODUCTION

Bronchiectasis (broncos, airways; ectasia, dilatation) is a morphologic term used to describe abnormal, irreversibly dilated and thick-walled bronchi. It is defined as an irreversible dilation and destruction of one or more bronchi with a reduction in clearance of secretions and in the expiratory airflow. This is an anatomic definition that evolved from Laennec's original description in 1819 of ectatic bronchi in pathological specimens.

Bronchiectasis represents the end stage of a variety of pathological processes that causes permanent destruction of the bronchial wall and its surrounding supporting tissues. Main pathologic types of bronchiectasis are as follows: Cylindrical, Cystic, Varicose and Tractation. Etiologies include prior lung infection, systemic inflammatory disorders, and genetic disorders of host defense, however, bronchiectasis is considered to be idiopathic in up to half of the affected individuals.

The clinical manifestations include chronic cough and copious mucopurulent expectoration. It can lead to recurrent lower respiratory tract infections, worsening pulmonary functions, respiratory failure and resulting in deterioration in quality of life, with increased morbidity and premature mortality. The incidence and prevalence of bronchiectasis are generally not well known and are underestimated in developing countries. Although the prevalence once declined over the past years in societies with high socioeconomic status, probably due to the development of preventive medicine, especially childhood immunizations, and improvement of the living conditions and widespread use of antibiotics, nowadays bronchiectasis has been recognized more, mainly due to the frequent use of high resolution computerized tomography (HRCT). Modern molecular technologies including next generation sequencing (NGS) have become invaluable tools to identify microorganisms directly from sputum and which are difficult to culture using traditional agar based methods. These have provided important insight into our understanding of emerging pathogens in the airways of people with bronchiectasis and the geographical differences that occur.

METHODOLOGY**Study Design:**

This study was a Observational study, performed in the department of Respiratory medicine at a tertiary care teaching institution.

Study Population:

After Ethics committee approval with proper informed consent, 160 patients patient were selected by adhering to the inclusion and exclusion criteria from patients admitted in ward & attended OPD who were diagnosed with Bronchiectasis.

Inclusion Criteria:

1. Age greater than 18 years of age.
2. Patients consenting for study.
3. Patient who are diagnosed with Bronchiectasis radiologically.

Exclusion Criteria:

1. Patients aged less than 18 years age.
2. Patients not consenting for study.
3. Hypoxia: Spo₂ < 94%.
4. Sputum positive pulmonary tuberculosis.
5. Pneumothorax.
6. Acute or recent cardiac events.
7. Pregnancy.
8. Recent abdominal, thoracic and eye surgery.

Study Investigation

Detailed demographic and clinical parameters including age, sex, medical history chiefly included respiratory symptoms with duration such as cough with sputum production, dyspnoea on exertion, hemoptysis, fever, chest pain and other constitutional symptoms. The physical examination included general examination including temperature, pulse, blood pressure, respiratory rate, SpO₂ level, pallor, cyanosis, digital clubbing, edema, cyanosis and lymphadenopathy. The detailed respiratory system and other systemic examination was done. Blood investigations were carried out for all the patients which included Hemoglobin, Complete blood count, Differential Leukocyte count, Absolute Eosinophilic count, Blood sugar- fasting/ post-prandial, HIV and HbsAg. investigations like Serum IgE, Aspergillus specific serum IgE, alpha-1 antitrypsin level were also done in indicated cases. all patient underwent Radiological investigation including chest X-ray and High Resolution Computed Tomography (HRCT) Scan. Spirometric function test was done to see the pattern of airway resistance. Spirometric function test was performed with Spirometer and carried out in the Pulmonary Function laboratory of the department of Pulmonary Medicine. and the resistance patterns (Obstructive/Restrictive/Mixed) were recorded. Sputum

culture for aerobic and anaerobic microorganism and sensitivity was done. Sputum microscopy by Ziehl-Nielsen staining for acid fast bacilli.

RESULT

Out of 160 total patients, 2(1.3%) patients were ≤ 20 years old, 40 (25%) patients were between 21-30 years, 18 (11.3%) patients were between 31-40 years, 25 (15.6%) patients were between 41-50 years, 33 (20.6%) patients were between 51-60 years, 38 (23.8%) patients were between 61-70 years and 4 (2.5%) patients were > 70 years of age. 100(62.5%) patients were male and 60(38.5%) patients were female.

Table 1: Distribution of Patients According to Underlying Etiology.

Underlying Etiology	Number of Patients (n=160)	Percent (%)
Pulmonary Tuberculosis	48	30.0%
Pneumonia	27	16.9%
ABPA	22	13.8%
Bronchial Asthma	17	10.6%
COPD	14	8.8%
Inflammatory Disease	12	7.5%
NTM	6	3.8%
AATD	4	2.5%
PCD	4	2.5%
CF	2	1.3%
Aspiration Pneumonia	2	1.3%
Immunodeficiency Disorders	2	1.3%

In this study, 48 (30.0%) patients had past history of pulmonary tuberculosis, 27 (16.9%) patients had past history of pneumonia, 22 (13.3%) patients had ABPA (Allergic Broncho Pulmonary Aspergillosis) and 6 (3.8%) patients had NTM (Non-tuberculous Mycobacteria). 17 (10.6%) patients had associated bronchial asthma and 14 (8.8%) patients had associated COPD (Chronic Obstructive Pulmonary Disease). 12 (7.5%) patients had associated inflammatory Diseases. 4 (2.5%) patients were suffering from AATD (Alpha-1 Antitrypsin Deficiency Syndrome), 4 (2.5%) patients were suffering from PCD (Primary Ciliary Dyskinesia) and 2 (1.3%) patients were suffering from CF (Cystic Fibrosis). 2 (1.3%) patients had past history of aspiration pneumonia and 2 (1.3%) patients had immunodeficiency disorders. Most important cause leading to bronchiectasis was infections, in which, pulmonary tuberculosis was most common, followed by pneumonia and ABPA.

Among 160 patients, 140 (87.5%) were smokers including all (100%) males and 40(66.7%) females, while only 20 (33.3%) females were non-smokers. More smokers had bronchiectasis compared to non-smokers.

Out of 160 Patients, 16 (10%) patients of bronchiectasis had Diabetes Mellitus (DM), 34 (21.3%) patients had Hypertension, 127 (79.4%) patients had developed Pulmonary Arterial Hypertension (PAH), 16 (10%) patients had Ischemic Heart Disease (IHD) and 10 (6.3%) patients had HIV.

Table 2: Presenting Symptoms Related To Bronchiectasis.

Symptoms	Number of Patients (n=160)	Percent (%)
Cough with expectoration	138	86.3%
Dyspnoea on exertion	136	85.0%
Hemoptysis	103	64.4%
Fever	95	59.4%
Chest Pain	56	35.0%
Dry Cough	21	13.1%

Out of 160 total patients, 138 (86.3%) patients had cough with expectoration, 103 (64.4%) patients had hemoptysis, 136 (85%) patients had dyspnoea on exertion, 95 (59.4%) patients had fever, 56 (35%) patients were suffering from chest pain, and 21 (13.1%) patients had dry cough. Most common presenting symptoms were cough with expectoration and dyspnoea on exertion followed by hemoptysis.

Table 3: Types Of Bronchiectasis Based On HRCT Thorax.

Types of bronchiectasis	Number of Patients (n=160)	Percent (%)
Cylindrical	85	53.1%

Cystic	60	37.5%
Traction	3	1.9%
Varicose	12	7.5%

Most common type of bronchiectasis was cylindrical in 85 (53.1%) patients followed by cystic in 60 (37.5%) patients and varicose in 12 (7.5%) patients. Least pathological finding was traction type which was observed in only 3 (1.9%) patients.

Out of 160 patients, 101 (63.1%) patients had unilateral (U/L) lung involvement, out of which, 41 (97.6%) patients had unilobar distribution and 60 patients had multilobar distribution. 59 (36.9%) patients had bilateral (B/L) lung involvement, out of which 1 (2.4%) patient had Unilobar distribution and 58 (49.2%) patients had multilobar distribution. Thus, patients' having multilobar distribution is more common than Unilobar in bronchiectasis. RUL involvement was most common in bronchiectasis followed by LUL and LLL.

Table 3: Distribution Of Patients Based On Sputum Culture.

Bacterial growth on sputum culture.	Number of Patients (n=160)	Percent (%)
H.Influenzae	46	28.8%
S.Pneumoniae	40	25.0%
P.Aeruginosa	32	20.0%
No growth	19	11.9%
S.Aureus	16	10.0%
E.Coli	3	1.9%
Enterococcus	2	1.3%
Anaerobes	1	0.6%
Moraxella Catarrhalis	1	0.6%

Growth of bacteria on sputum culture was seen in 141 (88.1%) patients. Most common bacteria was H.influenza seen in 46 (28.8%) patients, followed by S.Pneumoniae in 40 (25.0%) patients, P.Aeruginosa in 32 (20.0%) patients and S.Aureus in 16 (10.0%) patients. E.Coli was found in only 3 (1.9%) patients, Enterococcus in 2 (1.3%) patients, and Anaerobes and Moraxella catarrhalis were seen in only 1 (0.6%).

Table 5 : Spirometry Findings (Obstructive/Restrictive/Mixed) In Patients Of Bronchiectasis.

Spirometry findings (Obstructive/Restrictive/Mixed)	Number of Patients (n=160)	Percent (%)
Normal	20	12.5%
Obstructive	90	56.3%
Restrictive	8	5.0%
Mixed	42	26.3%

Out of 160 patients, 90 (56.3%) patients had obstructive pattern on spirometry and 42 (26.3%) patients had mixed pattern. Only 8 (5.0%) patients had restrictive pattern. 20 (12.5%) patients had normal spirometry. Obstructive pattern was most commonly found in bronchiectasis, while restrictive pattern was least common.

Out of 90 patients who had obstructive pattern, 30 (33.3%), 41(45.55%), 2(2.2%) and 17 (18.9%) had mild, moderate severe and very severe obstruction respectively. most obstructions were of moderate severity.

DISCUSSION

In present study, out of 160 patients the Mean $\pm$ SD age was 46.5 ± 15.9 years with Median (IQR) age was 49 years. In this study, 100 (62.5%) patients were male and 60(37.5%) were female. According to the study by ANANYA PANDA ET AL.¹⁰⁶, in 2016, 101 patients were enrolled with median age of 38 years (range 18–65 years). There were 72 (68%) males and 29 (27.6%) females.

In the present study, Most common cause of bronchiectasis was post-infectious in which most common infection commonly Pulmonary Tuberculosis - 48 (30.0%) followed by pneumonia - 27 (16.9%) and ABPA - 22 (13.8%). Least infection was NTM in 6 (3.8%) patients. In the similar study done by ANWAR ET AL.¹⁰² (n=189), most common cause of bronchiectasis was idiopathic, seen in 82 patients, followed by post-infections which were seen in 46 patients. Inflammatory diseases were present in 14 patients. 7 patients had ABPA, 6 had bronchial asthma, 2 had AATD, 2 had aspiration pneumonia, 2 had PCD and another 2 had immunodeficiency disorders.

In our study, Most common symptom was cough with expectoration observed in 138 (86.3%) patients followed by dyspnoea on exertion observed in 136 (85.0%) patients, hemoptysis seen in 103 (64.4%) patients, fever in 95 (59.4%), chest pain in 56 (35.0%) and dry cough in 21 (13.1%) patients. Most common auscultation findings was bibasilar crackles, seen in 137 (85.6%) patients, and the digital clubbing was present in 115 (71.9%) patients. Similar study conducted by P.T. KING ET AL.¹⁰³ showed that productive cough was the most common symptom and was present in 96% of the patients followed by dyspnoea observed in 60% of patients. Hemoptysis was present in 26% and chest pain in 19% of the patients. Crackles were present in 73% of patients, wheeze in 21% of patients and clubbing in 2% of patients.

In present study, unilateral lung involvement was more common and seen in 101 (63.1%) patients, as compared to HABESOGLU STUDY, in which, bilateral lung involvement was commonly observed (62.5%).

In present study, out of 160 patients the predominant type of bronchiectasis in HRCT scan was cylindrical in 53.1% of the patients followed by cystic in 37.5% of the patients and varicose in 7.5% of the patients. In a similar study conducted by ANGRILL AGUSTI, DE CELIS ET AL.¹⁰⁸, most of the patients (73%) presented with cylindrical bronchiectasis according to the HRCT scan and cystic- varicose in 27% of the patients.

In the present study, the most common isolated bacterium was H. Influenzae which was found in 46 (28.8%) patients. Other common bacteria were S. Pneumoniae which was isolated in 40 (25%) patients and P. Aeruginosa isolated in 32 (20%) patients. Other isolated bacteria were S. Aureus (10%), E. coli (1.9%), Enterococcus (1.3%), Moraxella Catarrhalis (0.6%) and Anaerobes (0.6%). In 19 (11.9%) patients, no pathological microorganisms were found. In a similar study conducted by PAUL T. KING, S. R. HOLDSWORTH ET AL.¹⁰⁹, the most common bacterium isolated was H. Influenzae, present in 42 (47%) patients. The next most common bacteria were P. Aeruginosa isolated in 11 patients (12%), Moraxella Catarrhalis in 7 patients (8%) and S. Pneumoniae isolated in 6 (7%). Only 3 patients had S. Aureus isolated. 2 patients had Aspergillus spp. isolated from their sputum, 2 had E. Coli (2%) and 2 had Mycobacterium Avium Complex. A large number of patients (21%) had no potential pathogenic microorganisms.

In the present study, most common spirometry finding was obstructive pattern which was obtained in 90 (56.3%) patients followed by mixed pattern observed in 42 (26.3%) patients. Only 8 (5%) patients had restrictive pattern. In a similar study conducted by HABESOGLU ET AL.¹⁰⁵, spirometric measurements of 274 patients were normal in 59 patients (21.5%), obstructive in 128 (46.7%), restrictive in 22(8%), and mixed in 65 (23.7%) patients.

In the present study, most common type of obstruction in patients of bronchiectasis was of moderate type (45.55%) followed by mild (33.3%), very severe (18.9%) and severe (2.2%). In a study conducted by D GOTHU ET AL.¹⁰⁴, mild obstruction was present in 20% patients, moderate in 47% and severe obstruction in 33% of the patients.

CONCLUSION

In present study, Mean age of presentation was 21-30 years, followed by 61-70 years, Affecting Male predominantly. Most important etiology was post-infections, pulmonary tuberculosis followed by pneumonia. The cardinal symptoms of bronchiectasis were productive cough followed by dyspnoea on exertion among all patients of bronchiectasis. The commonest clinical sign was bilateral end-inspiratory crackles followed by digital clubbing. The most common bacteria isolated from sputum culture were Haemophilus Influenzae followed by Pseudomonas Aeruginosa and Streptococcal Pneumonia. The commonest radiological pattern of bronchiectasis was cylindrical followed by cystic and varicose. Most of the patients had obstructive pattern in spirometry tests followed by mixed, normal, and restrictive pattern. Proportions of pulmonary artery hypertension were higher during the course of bronchiectasis, so 2D-echocardiography must be done in all patients of bronchiectasis. Our study concluded that radiological findings and spirometry test are more valuable for early and accurate diagnosis of bronchiectasis in relation to clinical parameters, which help in early and prompt management of bronchiectasis, and thus decrease the morbidity and mortality due to diseases and its complications. It also concluded that cases of bronchiectasis have repeated history of admissions in the hospital,

hence all options of treatment including surgical intervention must be taken into consideration for good quality life and healthy survival.

Abbreviation :

ABPA: Allergic BronchoPulmonary Aspergillosis AATD: Alpha-1 Antitrypsin Deficiency BA: Bronchial Asthma CF: Cystic Fibrosis COPD: Chronic Obstructive Pulmonary Disease NTM: Non-Tubercular Mycobacterium PCD: Primary Ciliary Dyskinesia PTB: Pulmonary Tuberculosis HIV: Human Immunodeficiency Virus DM: Diabetes Mellitus HTN: Hypertension PAH: Pulmonary Artery Hypertension IHD: Ischemic Heart Disease

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