ORIGINAL RESEARCH PAPER

Respiratory Medicine

CLINICAL, RADIOLOGICAL AND MICROBIOLOGICAL PROFILE OF PATIENTS WITH BRONCHIECTASIS AT A TERTIARY CARE HOSPITAL

KEY WORDS: Bronchiectasis, aetiology, microbiology, radiology and complications

Aravind Guru Prakash — Junior Resident, Dept. of Respiratory Medicine, MMIMSR, MM (Deemed to be) University, Mullana, Ambala, Haryana, India

Jai Kishan* — Prof. & HOD, Dept. of Respiratory Medicine, MMIMSR, MM (Deemed to be) University, Mullana, Ambala, Haryana, India. *Corresponding Author

Sameer Singhal — Professor, Dept. of Respiratory Medicine, MMIMSR, MM (Deemed to be) University, Mullana, Ambala, Haryana, India.

Safarudeen Sapharullah — Junior Resident, Dept. of General Surgery, MMIMSR, MM (Deemed to be) University, Mullana, Ambala, Haryana, India

Anchal Khanna — Junior Resident, Dept. of Respiratory Medicine, MMIMSR, MM (Deemed to be) University, Mullana, Ambala, Haryana, India

ABSTRACT

Bronchiectasis should be kept as possibility in all patients of chronic chest infections, pulmonary tuberculosis and Post COVID cases. HRCT chest can pick up the cases of bronchiectasis better especially those having tractional bronchiectasis, bronchiectasis sicca and also small aspergillomas in bronchiectatic cavities. More the lobes involved, more extensive the disease and poorer the outcome. Bronchiectasis driven by tuberculosis occurs due to fibrosis leading to tractional bronchiectasis, distension by mucus, caseous tissue or secondary infection beyond bronchial stenosis and compression of bronchus by mediastinal gland. Pseudomonas Aeruginosa was the most common organism isolated which can colonize and difficult to get rid of because of their biofilms which exhibit an intrinsic resistance to antibiotics. All the cases of bronchiectasis should be investigated for causative organisms so as to give specific treatment and to prevent further damage and complications to the lungs. Chest physiotherapy and vaccination can be useful adjuncts in managing bronchiectasis.

INTRODUCTION

"Inflammation is a two-edged sword; it can be helpful or harmful" - P J Cole [6]

Bronchiectasis, a derivative of two Greek words: bronchos meaning airway and ectasis meaning stretching out, is defined as an irreversible damage and dilatation of one or more medium sized bronchi, with a reduction in the clearance of respiratory secretions and expiratory airflow limitations which clinically presents with chronic cough, sputum production (foul smelling or purulent) and exacerbation of recurrent respiratory infections [1].

Persistent airway inflammation and copious mucus secretions trigger mucus plugging and bronchial wall thickening leading to its damage, causing further reduction in lung function [2]. This disease can be secondary to pulmonary infection, ciliary disorders, obstructive lung diseases, immunodeficiency diseases or congenital disorders.

The idea of vicious cycle of inflammatory insults and recurrent infection, was initially suggested by Peter Cole et al. 37 years ago, has been accepted as pathogenesis of the disease. This vicious cycle concept proposes that chronic bacterial endobronchial infection and inflammation can destroy muco-ciliary defences, resulting in secretion stasis, which propagates further bacterial illness and also increases bronchial dilatation and airway inflammation[3].

Most frequent organism isolated are haemophilus influenzae and pseudomonas aeruginosa [4]. Staphylococcus aureus might indicate presence of cystic fibrosis [5]. Isolation of aspergillus fumigatus might require work up for ABPA [6]. Anaerobic infections are more commonly seen in non-CF bronchiectasis [7].

MATERIAL AND METHODS:

This was a cross sectional study that was conducted on OPD and IPD patients in the Department of Respiratory Medicine, M.M. Institute of Medical Sciences and Research, Mullana from 12/08/2021 till 12/08/2022. HRCT was done for all patients with suspicion of bronchiectasis based on clinical history, clinical examination and chest X-ray findings. All patients who were diagnosed to have bronchiectasis based on HRCT findings, who gave written informed consent to be the part of the study were included and a study proforma was filled for them.

In the study, patients with complaints of cough with purulent expectoration, with or without haemoptysis, shortness of breath, fever and radiological features suggestive of bronchiectasis were included.

Information was collected about the demographic data, symptomatology, childhood history, personal history and significant past history. The radiological involvement was evaluated using chest x-ray and HRCT chest. The microbiological colonisation was evaluated by sputum examination for AFB smear, non-tuberculous mycobacterium culture, fungal KOH mount, bacterial culture and sensitivity testing.

Statistical Analysis

Statistical analysis was done using the Microsoft Excel and SPSS software with the help of a statistician. P value was used to assess the significance of correlation between the variables. Pearson correlation was used to assess the strength of correlation between the variables. Chi-square test was performed between two groups and its statistical significance is calculated.

RESULTS

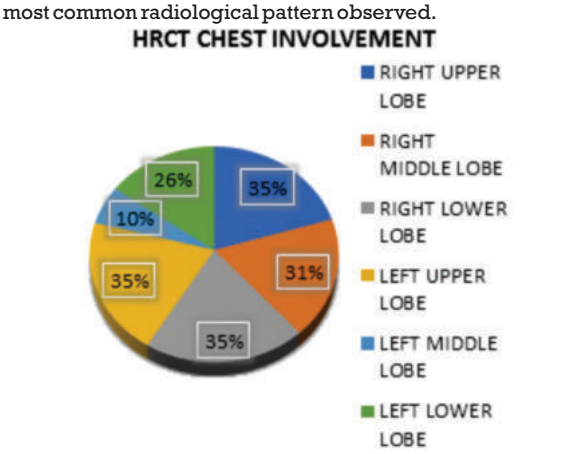
Among 100 patients, 52% were male and 48% were female. Maximum clustering (29%) was in the age group of 60 to 69 years. Mean age of the study population was 52 years.

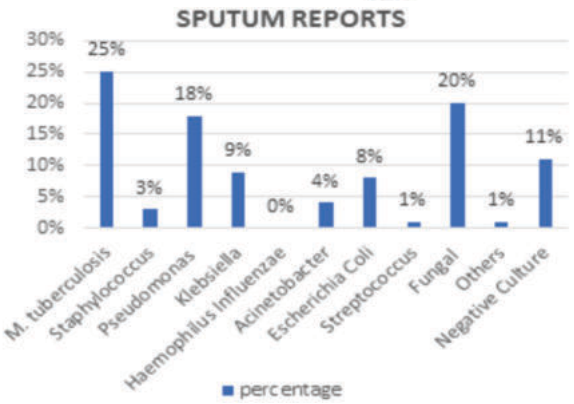
Cough with sputum was the common symptom in 66% patients and 47% had breathlessness. Out of 100 patients, 43% had past history of tuberculosis, 21% had no definite aetiology, 15% had post COVID status and 10% had past history of pneumonia.

Diabetes was the most common co-morbidity seen in 31% patients. It also seen that 3 patients of bronchial asthma along with bronchiectasis showed Specific IgG or Ig E positive for aspergillus and rest 2 cases of bronchial asthma were negative for aspergillus.

Most commonly involved zones were bilateral upper zones whereas left middle zone was least involved. Chest X ray is 68.18 % sensitive and 83.33 % specific in detecting bronchiectasis.

Bilateral upper lobes and right lower lobe were commonly involved lobes. More the lobes involved, more extensive the disease and poorer the outcome. HRCT is more sensitive and specific compared to x-ray. Tractional bronchiectasis is the most common radiological pattern observed.





Among 100 patients, 25% reported as sputum AFB positive. Pseudomonas Aeruginosa was the most common organism isolated in 18%, Klebsiella being the second most common, isolated in 9% followed by E. coli in 8% patients whereas 11% had a negative culture report.

20% patients had sputum KOH mount positive for fungal hyphae and 8% were positive for Specific Ig G and Ig E for aspergillosis.

34% patients presented with pneumonia as a complication of bronchiectasis.

DISCUSSIONS:

Gender Distribution:

Among 100 patients, 52% were male and 48% were female which showed a high male preponderance which is not the usual presentation as compared to literatures. In Indian setting, females have cultural taboo in spitting sputum so they have a habit of conscious swallowing of the secretions pretending to be the cause for late presentation of the disease.

Age Wise Distribution:

Distribution of age was 10-19 years (2%), 20-29 years (11%), 30-39 years (8%), 40-49 years (16%), 50-59 years (22%), 60-69 years (29%) and ≥70 years (12%). Maximum clustering (29%) was in the age group of 60 to 69 years. Minimum age was 17 years and maximum age was 80 years whereas the mean age was 52 years. This is because bronchiectasis in elderly population is due to immunosenescence or cumulative total of their past infections suffered during early childhood/adolescent or it can be because of comorbidities like diabetes mellitus, however younger population has less incidence of associated comorbidities.

Distribution Of Associated Symptoms:

Cough with sputum was the common symptom in 66% patients, followed by breathlessness in 47%, fever in 39%, dry cough in 27%, haemoptysis in 25%, sinusitis in 10%, foul smelling sputum in 8% and rhinitis in 7% patients. Breathlessness in bronchiectasis patients can be due to decreased lung function due to extensive disease or because of association of the disease with ABPA, COPD, Cor pulmonale, concomitant cardiac condition or anaemia secondary to haemoptysis and protein loss due to expectoration. Dry cough is common in bronchiectasis sicca (seen in upper lobes) and in tractional bronchiectasis (most often picked up only in CT). Haemoptysis can occur due to bronchopulmonary anastomosis. Aspergilloma can cause haemoptysis but it is more often missed in x-ray in case of small aspergilloma in cystic bronchiectasis or aspergilloma inside a small cavity. In such cases CT is required for early diagnosis and treatment. However, any infection especially tuberculosis can cause bronchial injury, ulceration and damage leading to haemoptysis.

Prevalence Of Smokers:

42% patients were smokers/reformed smokers and 58% were non-Smokers. Smoking further increases inflammation and damages the airway leading to further obstruction inside the airways which increases risk of COPD contributing to exacerbation episodes.

Etiology Of Bronchiectasis:

Out of 100 patients, 43% had past history of tuberculosis, 21% of had no definite etiology. 15% had post COVID status, 10% had past history of pneumonia, 3% had ABPA history and 3% had viral exanthematous fever. Bronchiectasis driven by tuberculosis occurs due to fibrosis leading to tractional bronchiectasis, distension by mucus, caseous tissue or secondary infection beyond bronchial stenosis and compression of bronchus by mediastinal gland. Post COVID fibrosis patient presented with tractional bronchiectasis and it was usually reversible once fibrosis resolves.

Co-morbidities Associated:

Diabetes was the most common associated co-morbidity seen in 31% patients which can increase the risk of TB and other pyogenic infections in patients with bronchiectasis. Majority of bronchiectasis patients with advancing age group had diabetes as a comorbid condition. Diabetics are more prone for atherosclerotic changes leading to hypertension and coronary artery disease.

X-ray Involvement:

Bilateral upper zone involvement was most common whereas left middle zone is least involved zone. Chest x-ray is 68.18 % sensitive and 83.33% specific, with positive predictive value of 96.77% and negative predictive value of 26.32 % in detecting bronchiectasis. This is because tractional bronchiectasis due to post tuberculosis fibrosis, ILD, post COVID is difficult to pick up in x-ray. Whereas HRCT rules out false negative findings and have ability to pick up its luminal diameter, bronchial thickening, mucus plugging and small airway abnormalities.

HRCT Chest Involvement:

Bilateral upper lobes (35% each) and right lower lobe (35%)

were the most commonly involved lobes, followed by right middle lobe (31%), left lower lobe (26%) and left middle lobe (10%). More the lobes involved, more extensive the disease and poorer the outcome. HRCT is more sensitive and specific compared to x-ray.

Radiological Pattern:

Tractional bronchiectasis (59%) is the most commonly observed radiological pattern, followed by cylindrical (23%), Cystic (17%) and varicose (7%). Due to recent epidemic of COVID-19, tractional bronchiectasis along with fibrosis featured in most of the post covid patients and also in COPD, post TB cases. Aspergilloma is more often missed on x-ray in case of smaller aspergilloma in cystic bronchiectasis or aspergilloma inside a small cavity in which CT is required for early diagnosis and treatment.

Sputum AFB Report:

Among 100 patients, 25% reported as sputum AFB positive and 75% negative for sputum AFB. Tuberculosis may cause bronchiectasis or it may develop as a complication of tuberculosis or it may be a reactivation of previous tuberculosis. However, none of them was found to be drug resistant TB. Bronchiectasis is caused usually due to tuberculous bronchitis especially in fibroid lesion stage, protracted bronchial obstruction by compression of hilar or interlobar lymphadenopathy or by infiltration of caseous lymph node to bronchial walls or it can be due to post TB fibrosis resulting in tractional bronchiectasis.

Sputum Culture Report:

Sputum culture report is an important parameter in managing bronchiectasis. Pseudomonas Aeruginosa (18%) was the most common organism isolated which can colonize and difficult to get rid of because of their biofilms which exhibit an intrinsic resistance to antibiotics. Klebsiella (9%) is the second most common organism isolated followed by E.Coli (8%), Acinetobacter Baumanni (4%), Streptococcus pneumoniae (1%) and 60% were negative for pyogenic culture. Significant downward trend was observed in the incidence of Staphylococcus Aureus (3%) and H. Influenza (0%) owing to vast vaccination and prophylactic antibiotics. Other causes for this downward trend can be persistence of aseptic inflammation or other causative organisms such as viral, fungal or TB. Poor quality specimen, delay in transportation of specimen, anaerobic bacteria, non-tubercular mycobacterium can be other possible causes to some extent.

Sputum Fungal Hyphae Report:

20% patients had sputum KOH positive for fungal hyphae. Aspergillus is commonly prevalent filamentous fungal infection found in bronchiectasis patient and ABPA may complicate asthma which can complicate pre-existing bronchiectasis. 8% patients were positive for Specific Ig G and Ig E for aspergillosis. Fungus can also be an oral commensal or it can be a pathogen. In such cases repeat sputum KOH mount or BAL study can be performed along with biomarkers such as BAL galactomannan, β D- glucan.

Complications Observed:

Pulmonary complications of bronchiectasis like pneumonia (34%), haemoptysis (25%), cor pulmonale (9%), aspergilloma (8%), lung abscess (7%), empyema (4%), septicaemia (2%) was observed. Secondary infections in bronchiectasis can cause pneumonia and lung abscess if infection travels to adjacent visceral pleura which can lead on to pleuritis and may rupture leading on to empyema. Haemoptysis can occur due to bronchopulmonary anastomosis. Non- pulmonary complications such as sinusitis (10%) was observed and no patients of amyloidosis (0%) were seen. Amyloidosis is one of the complications of chronic cases of bronchiectasis with persistent infection but amyloidosis incidence may have decreased due to advent of antibiotics which has reduced the incidence of chronic cases of bronchiectasis.

CONCLUSION:

Conclusion of this study is that bronchiectasis should be kept as possibility in all patients of chronic chest infections, pulmonary tuberculosis and Post COVID cases. HRCT chest can pick up the cases of bronchiectasis better especially those having tractional bronchiectasis, bronchiectasis sicca and also small aspergillomas in bronchiectatic cavities. All the cases of bronchiectasis should be investigated for causative organisms so as to give specific treatment and to prevent further damage and complications to the lungs. Chest physiotherapy and vaccination can be useful adjuncts in managing bronchiectasis.

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