Original Article

An Insight into Bronchiectasis: Causes, Clinical Features, and Treatment Practices

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Abstract

Introduction: Bronchiectasis is a common, progressive respiratory disease characterized by irreversibly dilated, damaged, and thickened bronchi. It is present as a clinical syndrome of chronic cough, sputum production, and recurrent lower respiratory tract infections. The diagnosis depends on a degree of strong clinical and radiological suspicion. The aim of study was to give an overview of the causes, clinical features, and treatment practices of patients with bronchiectasis. **Patients and Methods:** This was a single-center, hospital-based, prospective, observational study in nonrandomized consecutive patients. All suspected cases were investigated by performing relevant blood, sputum, and radiological investigations. Diagnosis and etiology were confirmed with High Resolution Computed Tomography and clinical evaluation. Diagnosed cases were prescribed treatment as per the standard guidelines and followed up for a year. **Results:** Symptom wise, all enrolled patients had cough with expectoration, 71% complained of dyspnea, 41% had hemoptysis, and 35% had chest pain. Etiologically, bronchiectasis was postinfective in 46.5% and posttubercular in 34.9% cases. Antibiotics and pulmonary rehabilitation were taken by 28% of the cases, and antibiotics, pulmonary rehabilitation, and bronchodilators were taken by 25%. **Conclusions:** Although considered an "orphan" disease, bronchiectasis still accounts for a considerable number of patients, especially in a tertiary care center. When suspected on the chest radiograph, it can be confirmed on the high-resolution computed tomography thorax. Postinfective causes such as pneumonia and tuberculosis appear to be the predominant etiology leading to bronchiectasis. Treatment strategies are mainly symptomatic, and the disease can be controlled with appropriate antibiotics and pulmonary rehabilitation.

Keywords: Bronchiectasis, hemoptysis, orphan, pulmonary rehabilitation

Introduction

Bronchiectasis is a common, progressive pulmonary disease characterized by irreversibly dilated, damaged, and thickened bronchi. It is present as a clinical syndrome of chronic cough, sputum production, and recurrent lower respiratory tract infections. Bronchiectasis is the end-stage of a variety of pathologic processes.[1,2] The etiology of bronchiectasis is not same in different populations. Congenital or acquired immune deficiency syndromes, metabolic disorders, and congenital ultrastructural defects are the common causative factors in the Western countries, while bacterial and viral infections are the major causes of bronchiectasis in the developing countries.

This study aims to provide a concise overview of the causes, clinical features, and treatment practices of patients with bronchiectasis.

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Patients and Methods

This was a hospital-based single-center, prospective, observational study done between 2013 and 2015. Ethics committee approval was obtained prior to the study. All suspected patients of bronchiectasis as per symptoms were included in the study after their informed consent. Patients of age 12 years and above, with a daily cough that occurs over months or years, daily production of large amount of sputum, shortness of breath or wheezing, chest pain, and with a finding

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of crackles on auscultation were included in the study. Patients not willing to give consent, those having chronic obstructive pulmonary disease (COPD), and immunocompromised states such as diabetes and chronic renal failure were excluded from the study.

After enrolling patients, their information was collected on a predesigned pro forma, which included detailed clinical history, general, and systemic examination. All suspected cases were investigated by performing relevant blood, sputum, and radiological investigations. Diagnosis was confirmed, and etiology established in the studied cohort. Diagnosed cases were prescribed treatment as per the standard guidelines and followed up for a year. The collected data were represented in proportions and percentages.

Results

A total of 63 suspected cases were enrolled in the study, of which 43 were confirmed. The mean age was 40.9 (±11.23) years. Majority of both suspected and confirmed cases were males (70% and 60.4%, respectively). The percentage of suspected cases was higher among nonsmokers (58.7%) than smokers (36.5%) and tobacco chewers (4.8%). Similarly, the percentage of confirmed cases was higher among nonsmokers (72%) than smokers (21%) and tobacco chewers (7%).

Greater proportion of both suspected and confirmed cases was found to be rural area dwellers (70% and 72%, respectively). Socioeconomic status (SES) was evaluated using the BG Prasad classification. The percentage of suspected cases was higher among SES IV (51%) than SES III (25%), II (11%), V (8%), and I (5%). The percentage of confirmed cases was also higher among SES IV (56%) than SES III (21%), II (12%), V (7%), and I (4%). Majority of the cases did not know about the immunization. Only 7% knew about the vaccination as per the Expanded Program on Immunization.

Symptom wise, all enrolled patients had cough with expectoration. About 71% complained of dyspnea, 41% had hemoptysis, and 35% had chest pain [Figure 1]. Majority (55%) had these symptoms from 1 to 5 years. About 19% had symptoms since childhood, while an equal proportion (12.7%) had duration of illness from 6 to 10 years and ≥10 years, respectively [Table 1]. The amount of sputum was < 100 ml in 57.1% of patients, while it was higher in the rest. The consistency of sputum was mostly mucoid (54%) and purulent in 39.7% [Figure 2].

The clinical signs seen in these patients are shown in Figure 3. Etiologically bronchiectasis was postinfective (pneumonia, measles, pertussis etc.) in 46.5% and posttubercular in 34.9% of cases. The percentage of other etiology was < 10% [Table 2]. All suspected cases underwent chest X-ray. An abnormal chest X-ray was seen in 84% of the cases. Hyperinflation and flattening of diaphragm, ring opacities, crowding of pulmonary vascular markings, and cysts with air fluid level were seen. All patients with abnormal chest X-ray underwent high-resolution computed tomography (HRCT). Majority (83%) of them were consistent with findings of bronchiectasis, and others had features of both COPD and bronchiectasis.

On bacteriological examination of sputum, Gram-positive

Table 1: Distribution of suspected cases of bronchiectasis according to duration of sputum production

Duration of sputum production (years)	Suspected cases (*n*=63), *n* (%)
Since childhood	12 (19.0)
1-5	35 (55.6)
6-10	8 (12.7)
>10	8 (12.7)

Table 2: Etiologies of bronchiectasis cases (*n*=43)

Cause	*n* (%)
Idiopathic	2 (4.7)
Posttubercular	15 (34.9)
Postinfective (pneumonia, measles, pertussis etc.)	20 (46.5)
ABPA	4 (9.3)
Cystic fibrosis	1 (2.3)
Primary ciliary dyskinesia	1 (2.3)

ABPA: Allergic bronchopulmonary aspergillosis

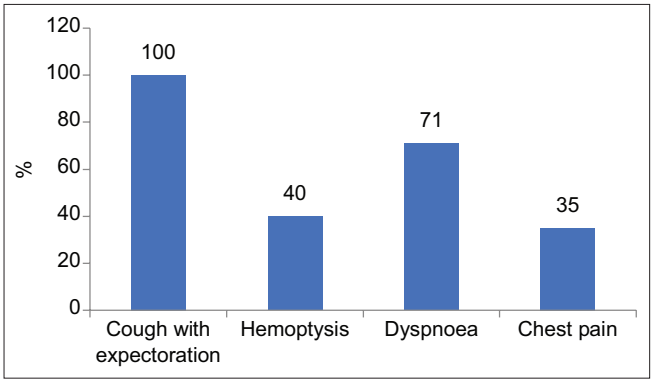

Figure 1: Suspected cases of bronchiectasis according to symptoms

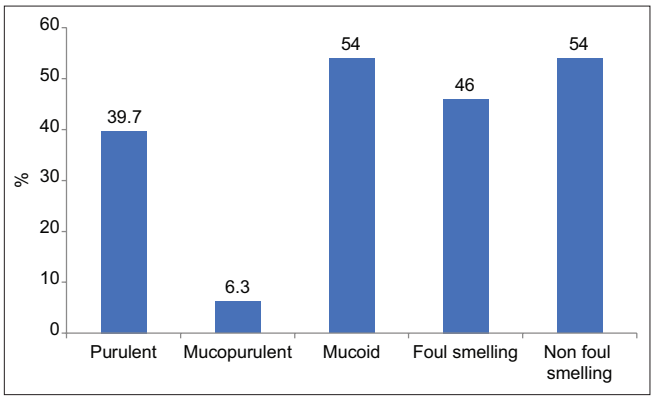

Figure 2: Distribution of suspected cases of bronchiectasis according to sputum consistency

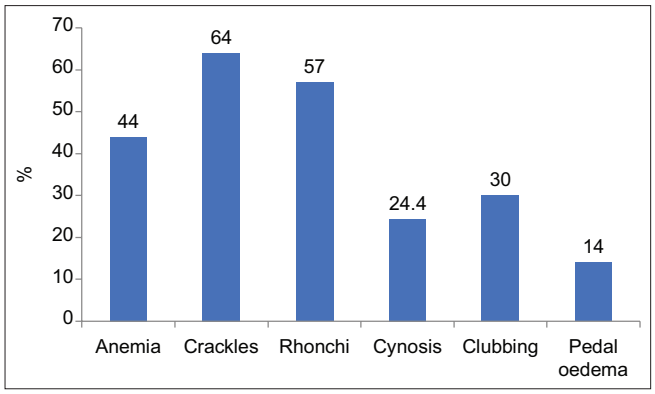

Figure 3: Clinical signs seen in suspected cases of bronchiectasis

cocci (nonpathogenic) were found in 50% of the cases, and Gram-negative bacilli (*Pseudomonas aeruginosa*) were seen in 31% of the cases. Gram-positive bacilli (nonpathogenic) were found in 12% of the cases. Antibiotics, chest physiotherapy, and postural drainage were taken by 28% of the cases, whereas 25% received bronchodilators in addition. Bronchodilators and bronchodilator expectorants were taken by 16% [Table 3].

Table 3: Treatment practices of bronchiectasis cases according to the past prescription they had (*n*=43)

	n (%)
Antibiotics, anti-inflammatory, and bronchodilator expectorants	4 (9.0)
Antibiotics and chest physiotherapy	1 (2.0)
Antibiotics, chest physiotherapy and postural drainage	12 (28.0)
Antibiotics and bronchodilators	6 (14.0)
Antibiotics, chest physiotherapy, postural drainage, and bronchodilators	11 (25.0)
Bronchodilators and bronchodilator expectorants	7 (16.0)
Antibiotics steroids	4 (9.0)

Discussion

Bronchiectasis is an underdiagnosed condition.[3,4] The diagnosis relies on a degree of strong clinical suspicion. A study has shown an average model delay between the onset of symptoms and diagnosis of 17 years. Clinical experience suggests that patients are often initially labelled as having COPD or asthma before bronchiectasis is suspected.[5] The introduction of HRCT has improved the diagnosis of bronchiectasis. Radiologically, when the diameter of bronchus is more than the vascular diameter, it denotes abnormal dilatation as seen in bronchiectasis. Bronchiectasis could be cylindrical/tubular, varicose, and cystic type.[6]

Bronchiectasis is considered as an "orphan" disease.[6] Bronchiectasis has many aspects of treatment nowdays. Pulmonary rehabilitation could improve the quality of life and exercise capacity in people with noncystic fibrosis bronchiectasis. The long-term use of antibiotics improves clinical response rates but may not have effect on the frequency of exacerbation. Surgical excision is considered in patients who are at risk for severe infection or bleeding. Early suspicion of bronchiectasis, timely recognition, and adequate treatment can help to control the progression of bronchiectasis. People need a life-long treatment. Awareness of treatment in bronchiectasis may reduce complications and raise life expectancy.

Our present study was conducted with the objective to know the causes, clinical features, and treatment practices of bronchiectasis at the Department of Respiratory Medicine, King Georges Medical University, UP, Lucknow. A total of 63 suspected cases were enrolled in the study after taking informed consent, out of which 43 were confirmed.

Majority of both suspected and confirmed cases were in the age group of 30–60 years, with a mean age of 40.9 ± 11.23 years. In the study by Habesoglu *et al*.,[6] where they retrospectively evaluated 304 patients with bronchiectasis, the mean age of the patients was 56 ± 25 years (range: 17–92 years). The patients were mostly between 50 and 80 years of age. In a study done by King *et al*.,[7] among 103 cases of newly diagnosed bronchiectasis, the mean age of the group was 56 years. The reason for younger group predominance might be due to the fact that most of suspected cases in this study were postinfectious and posttubercular cases, both of which usually affect the younger age group. Our study showed a male predominance, while the other two registered a slight female predominance.

There were also a smaller number of smokers in this study, similar to other studies.[6,7] This may be attributed to the onset of cough since childhood in most patients which becomes worse on smoking, reducing the likelihood of their developing the habit. Demographically, majority of patients were from the lower socioeconomic strata and resided in a rural dwellings. To the best of knowledge of the researcher, none of the study had reported distribution by dwelling and SES.

In our study, the underlying cause for bronchiectasis in a majority of patients was found to be postinfective (46.5%) or posttubercular (34.9%). These findings are similar to the study by Habesoglu *et al*.[6] and Shoemark A *et al*.,[8] in which 35.2% were postinfective. Bronchiectasis is commonly not a primary disease, but an anatomical abnormality as a result of many different factors. Pneumonia including tuberculosis infections at a younger age or childhood infections such as measles or pertussis was determined to be the reason of bronchial distortion in most of our patients. All other possible etiologies such as allergic bronchopulmonary aspergillosis, primary ciliary dyskinesia, and other idiopathic causes were negligible. This finding supports the theory, infectious agents are important in the etiology of bronchiectasis.

Cough with expectoration was the predominant symptom, followed by breathlessness, hemoptysis, and chest pain in that order. This finding is similar to other studies where chronic productive cough is the most common presentation of bronchiectasis. Hemoptysis in the present study is slightly

on the higher side than other similar studies probably as sequelae to tubercular infection. In the present study, the duration of sputum production was 1–5 years among 55.6% of the suspected cases. The amount of sputum was <100 ml in 57.1% in this study, and purulent expectoration was found in 39.5% of the cases. King *et al*.[9] reported that the majority of patients complained of excessive sputum production that was commonly mucopurulent and approximately over 30 ml/day. In the present study, the amount of expectoration was more than the similar studies. The reason for this could be delayed health-seeking behavior.

The common clinical signs were crackles and rhonchi, similar to the other studies. Clubbing was found in a third of the suspected cases indicating long-standing disease.

In the present study, only 7% knew about the vaccination received. The researcher is unaware of any study reporting about the vaccination status among patients with bronchiectasis. This suggests low level of awareness among the population for immunization despite a lot of effort by the government.

On evaluation of radiographic findings, abnormal chest X-ray was seen in 84% of the suspected cases, and bronchiectasis was confirmed in 81.1%. The findings were consistent with posttubercular and postinfective sequelae.

HRCT scanning has been the gold standard diagnostic method in bronchiectasis.[10] It can determine extent and type of the disease. In this study, cystic type of bronchiectasis was observed in majority of the patients. Cylindrical and varicose types were seen in 2% and 5%, respectively, which are consistent with the study done by Mehmet *et al*., in which cystic, cylindrical, and varicose type bronchiectasis were 46%, 47%, and 7.2%, respectively. Anatomical distribution on HRCT showed multilobar and bilateral lung involvement in most cases. Lower lobes were affected more often. This finding is in agreement with the posttubercular and postinfectious etiology present in most cases. In this study, the pulmonary hypertension was found in 12% of the cases. A similar finding was observed by Gothi *et al*.,[11] where 268 consecutive patients of chronic airway limitation were studied for the prevalence of pulmonary hypertension. Pulmonary hypertension was observed in 13% cases of bronchiectasis in the study.

Patients most commonly show reduction in the lung function, with airway obstruction being the predominant pattern in spirometry. Normal findings were seen in 15.8% of cystic cases and 5.3% in tractional. Obstructive airway disease was found in 52.6% of cystic bronchiectasis cases. Restrictive disease was seen in 13.2% of cystic and 2.6% in tractional. Mixed type was found in 2.6% of cylindrical, 7.9% of cystic, and 2.6% of varicose and tractional. Mehmet *et al*. observed that the test was normal in 59 patients (21.5%), obstructive in 128 (46.7%), restrictive in 22 (8%), and mixed in 65 (23.7%) patients. Lee *et al*.[12] have reported that the mixed-type pulmonary function abnormality is more commonly found in the cystic type similar to the finding of this study.

In this study, sputum samples appropriate for microbiological examination were obtained in 16 cases. The Gram-positive cocci (nonpathogenic) were found in 50% of the cases, and Gram-negative bacilli (*P. aeruginosa*) were seen in 31% of the cases. In the study by Paul *et al*.,[7] *Hemophilus influenzae* was found in 34/94 patientss. Other common bacteria were *Moraxella catarrhalis* (9/94 patients), *P. aeruginosa* (7/94 patients), and *Staphylococcus aureus* (5/94 patients). Thirty-six patients had a culture negative isolates.

On evaluation of the treatment given to the 43 diagnosed cases of bronchiectasis, it was found that the most common practices involved antibiotics and pulmonary rehabilitation which were taken by 28%, and antibiotics, pulmonary rehabilitation, and bronchodilators were taken by 25% of the cases.

In the present study, all the cases of idiopathic, cystic fibrosis, and primary ciliary dyskinesia had taken anti-tubercular treatment, and 65% postinfective cases had taken anti-tubercular treatment. In the best knowledge of the researchers, none of the studies had reported about the involvement of anti-tuberculosis treatment history. This suggest the low level of awareness among the physicians, as none of the physicians diagnosed the disease promptly and there is definitely lack of knowledge about the role of pulmonary rehabilitation. Wrongly prescribed anti-tuberculosis treatment was an expected finding because tuberculosis is common in India and often, every dot or blot on the chest X-ray may be regarded as tubercular lesion.

One of the limitations is that some of the patients were poor. Hence, HRCT could not be done among them, and the diagnosis could not be confirmed in these patients. In some of the patients, spirometry could not be performed due to poor effort and excessive cough and expectoration.

Conclusions

Although considered an "orphan" disease, bronchiectasis still accounts for a considerable number of outpatients and inpatients, especially in a tertiary care center. Commonly presenting by middle age with variable gender predilection, the condition has typical symptoms and clinical findings. When suspected on a chest radiograph, it can be confirmed on HRCT. 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. Treatment strategies are mainly symptomatic, and the disease can be controlled with appropriate antibiotics and chest physiotherapy.

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Conflicts of interest

There are no conflicts of interest.

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