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Fungal infections in chronic stable bronchiectasis patients

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Abstract
Bronchiectasis is a chronic and etiologically heterogeneous disease, which is commonly characterized by a vicious circle of impaired mucociliary clearance, bronchial infection and inflammation, resulting in structural airway damage with abnormal and permanent widening. Fungal infection or colonization in chronic stable bronchiectasis patient is common precipitating or predisposing factor during acute exacerbation. Fungal culture of the sputum samples on sabouraud agar yielded Aspergillus sp. 2 out of 50, Candida albicans and Candida non albicans in each one patient.

Keywords: bronchiectasis, fungal infections

Introduction

Bronchiectasis is a chronic and etiologically heterogeneous disease, which is commonly characterized by a vicious circle of impaired mucociliary clearance, bronchial infection and inflammation, resulting in structural airway damage with abnormal and permanent widening [1]. The disorder mostly starts with a narrowing of the bronchial tree triggered by an infection, which may lead to destruction of the epithelium if it becomes chronic. In the past, bronchiectasis mostly had infectious causes, such as epidemics of pertussis, measles, and influenza. Today's most common cause in developing countries is the post infectious route [2]. In Indian population it is the third commonest non-tubercular respiratory diseases with the incidence of 71 per lakh [3, 4].

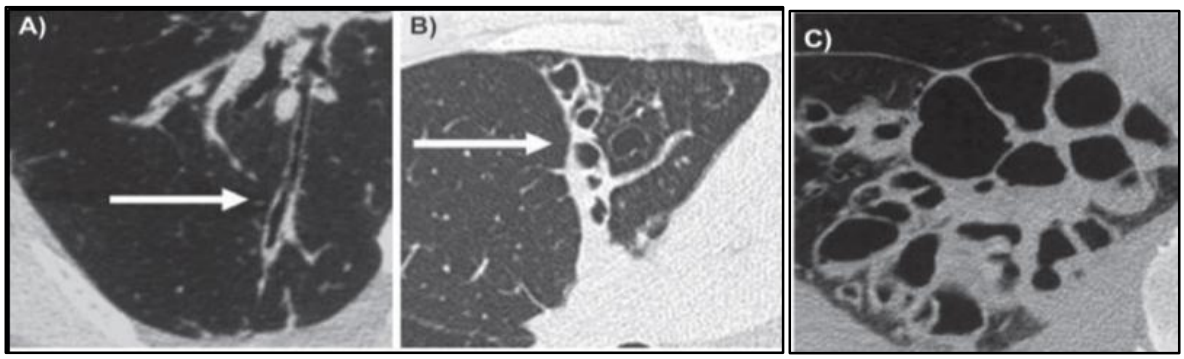
In pre antibiotic era, it was estimated to be as common as or more common than tuberculosis and to be present in 92 percent of cases of chronic bronchitis [5]. The diagnosis of bronchiectasis should be the beginning of a targeted search for causation, which may lead to directed treatment, thereby limiting the disease progression [6].

There is still a high incidence in developing countries and globally with the increased life expectancy of the general population; there is a greater risk of more people developing chronic illness, including bronchiectasis. Moreover, delays in diagnosis of bronchiectasis of years to decades commonly occur in children and adults, and it is likely that many remain undiagnosed and untreated, risking premature and accelerated pulmonary decline [7].

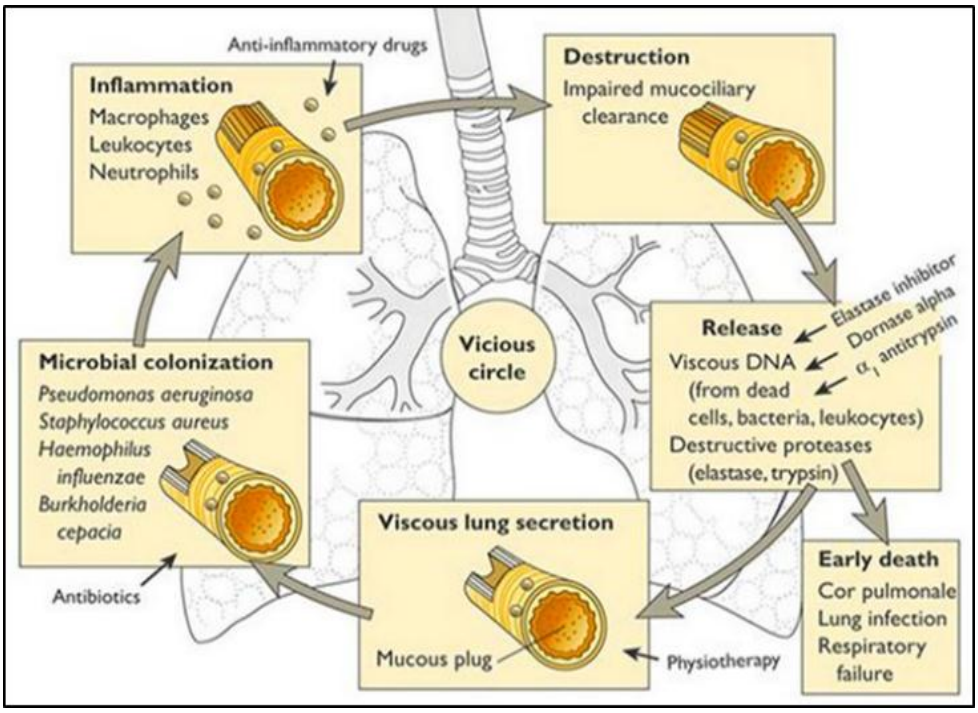
Bronchiectasis can be congenital but is most often acquired [8]. Congenital Bronchiectasis result from developmental arrest growth of the bronchial tree. Acquired Bronchiectasis require an infections insult, impairment of drainage, airway obstruction and /or a defect in host defence.

Reid categorized bronchiectasis as having three main phenotypes: 1) tubular characterized by smooth dilation of the bronchi; 2) varicose in which the bronchi are dilated with multiple indentations; and 3) cystic in which dilated bronchi terminate in blind ending sacs [9].

The CT appearance of these three different forms of bronchiectasis is demonstrated in Figure 1.



HRCT examples of Reid's three forms of bronchiectasis: A) tubular B), varicose, and C) cystic.
Abbreviation: HRCT, high-resolution computed tomography



Aetiology and factor associated with bronchiectasis [7]

- Congenital causes (eg. Mounier-Kuhn syndrome, Young syndrome)
- Chronic obstructive pulmonary disease and smoking
- Cystic fibrosis
- Mucociliary dysfunction (eg. primary ciliary dyskinesia)
- Primary or secondary immune deficiency (eg. hypogammaglobulinaemia, lung and bone marrow transplantation, malignancy, HIV/AIDS, HTLV1)
- Pulmonary fibrosis and pneumoconiosis (eg. silicosis)
- Postobstruction (eg. with a foreign body)
- Postinfection (eg. tuberculosis, adenovirus, recurrent pneumonia)
- Recurrent small volume aspiration (eg. from upper airway secretions or gastric contents)
- Allergic bronchopulmonary aspergillosis
- Systemic inflammatory diseases (eg. Rheumatoid arthritis, sarcoidosis)

Clinical Features

Patients with bronchiectasis complain of chronic cough, sputum production, and lethargy. Hemoptysis, chest pain, weight loss, bronchospasm, dyspnoea, and impaired physical performance have also been observed [10].

Role of Sputum Culture

Microbiological sputum analysis is a standard diagnostic procedure [11]. Patients with stable bronchiectasis commonly (usually 60-80%) have colonization with microorganisms in their airway. Microbiological evaluation of the distal airways in patients with stable bronchiectasis may aid in determining the role of colonisation in disease progression [12].

Research Objectives & Methodology

Present study was done to find out fungal infection in chronic stable bronchiectasis patients. It is a prospective study was carried out in chronic stable bronchiectasis patients concerning age, sex, associated factor.

Sputum for fungal culture and sensitivity done to find out fungal growth for secondary infection in this chronic stable bronchiectasis patients with exclusion criteria of age <18 years and immune-compromised condition. This study was done at C. U. Shah Medical College, Surendranagar Gujarat during Jan-2016 to Dec-2016.

Results

Fifty consecutive clinically stable patients with chronic bronchiectasis were studied over a Jan-2016 to Dec-2016 period.

Table 1 shows the demographic data of the bronchiectasis patients. Male (62%) and smokers (36%) predominated.

All patients underwent sputum analysis for fungal culture.

Fungal culture of the sputum samples on sabouraud agar yielded Aspergillus sp. 2 out of 50 and Candida albicans and Candida non albicans in one patient of each. All isolates were found to be sensitive to most of commonly used antifungal agents. (Flucanozole, Ketoconazole, Itraconazole, Voricanozole & Amphotericin-B).

Table 1: Demographic data of the bronchiectasis patients

Demographic data of the bronchiectasis patients		No. of patients	Total No. Patient
Sex	Male	31	50
	Female	19	
Smoking	Present	18	50
	Absent	32	
Age	30-45 years	15	50
	45-60 years	26	
	>60 years	9	

Table 2: Fungal culture growth in bronchiectasis patients.

Fungal Isolate in Sputum Culture	No. of patients	Total No. Patient
Aspergillus sp.	2	50
Candida albicans	1	
Candida non albicans	1	
No growth	46	

Discussion

This study shows that bronchial colonisation by potentially pathogenic microorganisms is common in patients with chronic bronchiectasis in a stable clinical situation. Sputum culture for fungus is an adjuvant tool for the evaluation of bronchial colonisation in these patients which leads to chronic sputum production. Using this investigation method, we observed that Aspergillus Sp. Microorganism isolated from two patients in our study. Also, we found that Candida albicans and Candida non albicans in one patient of each. So, we observed that four patients had (8%) fungal isolated organism out of 50 patients of chronic stable bronchiectasis patient. Angrill J [12] study showed that 1 patient had Aspergillus sp. fungal isolate out of 77 patients and 1 patient had candida sp. fungal isolate out of 77 patients. However, we did not find more studies on fungal infection in bronchiectasis patients. Interestingly, in our study on clinical ground observation that male patient (62%) and also smoking history past/current (36%) predominant. We had not find any study for antifungal agent sensitivity in fungal isolates from bronchiectasis patients. In this study all fungal isolates were found to be sensitive to most of commonly used antifungal agents. (Flucanozole, Ketoconazole, Itraconazole, Voricanozole & Amphotericin-B).

Conclusion

Sputum fungal culture- a convenient, non-invasive may be useful to know in fungal colonization & its anti-fungal treatment. Most of fungal isolate were sensitive to most of commonly used antifungal drugs in clinical practice.

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