



Contents lists available at ScienceDirect

Respiratory Medicine

journal homepage: www.elsevier.com/locate/rmed

Review article

Causes of chronic productive cough: An approach to management

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ARTICLE INFO

Article history:

Received 15 August 2014

Received in revised form

13 April 2015

Accepted 24 May 2015

Available online xxx

Keywords:

Cough

Sputum

Productive

Bronchitis

ABSTRACT

A chronic 'productive' or 'wet' cough is a common presenting complaint for patients attending the adult respiratory clinic. Most reviews and guidelines suggest that the causes of a productive cough are the same as those of a non-productive cough and as such the same diagnostic pathway should be followed.

We suggest a different diagnostic approach for patients with a productive cough, focussing on the conditions that are the most likely causes of this problem.

This review is intended to briefly summarise the epidemiology, clinical features, pathophysiology and treatment of a number of conditions which are often associated with chronic productive cough to aid decision making when encountering a patient with this often distressing symptom. The conditions discussed include bronchiectasis, chronic bronchitis, asthma, eosinophilic bronchitis and immunodeficiency.

We also propose an adult version of the paediatric diagnosis of protracted bacterial bronchitis (PBB) in patients with idiopathic chronic productive cough who appear to respond well to low dose macrolide therapy.

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1. Introduction

A chronic 'productive' or 'wet' cough is a common presenting complaint for patients attending the adult respiratory clinic. Most reviews and guidelines suggest that the causes of a productive cough are the same as those of a non-productive cough and as such the same diagnostic pathway should be followed [1].

Although it seems likely that all of the conditions which may present as a productive cough could present as non-productive cough our experience suggests that some conditions are much more likely to result in productive cough than others whilst some of the common causes of dry cough such as gastroesophageal reflux disease (GERD) less commonly cause productive cough. There is a lack of data on an association between upper airway causes of cough such as post nasal drip syndrome and productive cough and hence these have not been discussed in this review.

As such, this article is not a detailed systematic review of cough, but is intended to briefly summarise a number of conditions which are often associated with a chronic productive cough to aid decision

making when encountering a patient with this often distressing symptom. We also propose an adult version of the paediatric diagnosis of protracted bacterial bronchitis (PBB).

2. Causes of chronic productive cough

For the purposes of this review the definition of a "chronic productive cough" was considered to be a cough regularly leading to the expectoration of sputum with the same duration as the standard definition of chronic cough i.e. more than 8 weeks [2].

Conditions causing productive cough have been listed in an approximate order of prevalence from most to least frequent.

2.1. Bronchiectasis

Bronchiectasis is defined as the "irreversible abnormal dilatation of the bronchi". It is a common cause of chronic productive cough which is diagnosed by a high resolution CT (HRCT) scan demonstrating a bronchus with an internal diameter wider than its adjacent pulmonary artery which fails to taper and bronchi visualised 1–2 cm from the pleural surface [3].

2.1.1. Epidemiology

The prevalence of bronchiectasis is increasing in the UK and the USA, although it is unclear if this reflects a true increase in the

Abbreviations: GERD, Gastroesophageal Reflux Disease; HRCT, High Resolution CT; PBB, Protracted Bacterial Bronchitis.

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<http://dx.doi.org/10.1016/j.rmed.2015.05.020>

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number of cases or increased recognition of the condition due to more widespread HRCT scanning [4,5]. Prevalence generally rises with age and is highest in those aged ≥ 70 years. The condition is more prevalent in women. Total prevalence in the UK was estimated at 227/100,000 men and 309/100,000 women in 2011 [5].

2.1.2. Clinical presentation

The condition usually presents as a chronic productive cough [6], with daily sputum production [7]. Other factors that suggest the diagnosis include haemoptysis, systemic features of weight loss and fatigue and multiple positive sputum cultures [7,8].

2.1.3. Pathology

Bronchiectasis may be secondary to a multitude of other conditions (as listed in Table 1), with the most common predisposing factor thought to be post respiratory infection [9,10]. However, a significant proportion of cases have no obvious discernable cause, although the number of these idiopathic cases reported differs markedly between studies [9–11].

It has been suggested that bronchiectasis is largely a result of dysregulation of the immune system, as it is often seen in patients with either immunodeficiencies or “hyperimmune” (autoimmune) conditions such as Rheumatoid Arthritis or Inflammatory Bowel Disease [11,12]. Although the initial step in the pathogenesis of the condition is not yet clear, it is broadly accepted that it progresses in a largely similar way, based on the “vicious circle” hypothesis proposed by Cole [13], which describes a cycle of airway inflammation, leading to structural airway damage and resultant mucous stasis, with the pooled mucus becoming colonised with bacteria, which initiate further inflammation (Fig. 1).

The most common sputum isolates, using standard microbiological approaches, from patients with bronchiectasis are the gram negative bacteria *Haemophilus influenzae* and *Pseudomonas aeruginosa* [14,15]. Colonisation of the sputum by first *H. influenzae*, and later *P. aeruginosa*, coincide with worsening of the clinical features of bronchiectasis including lung function and frequency of exacerbation [14,15].

2.1.4. Treatment

Guidance on the treatment of bronchiectasis can be found in the BTS guidelines on bronchiectasis [16].

Broad principles in the management of the condition include treatment of the underlying cause, monitoring of disease activity

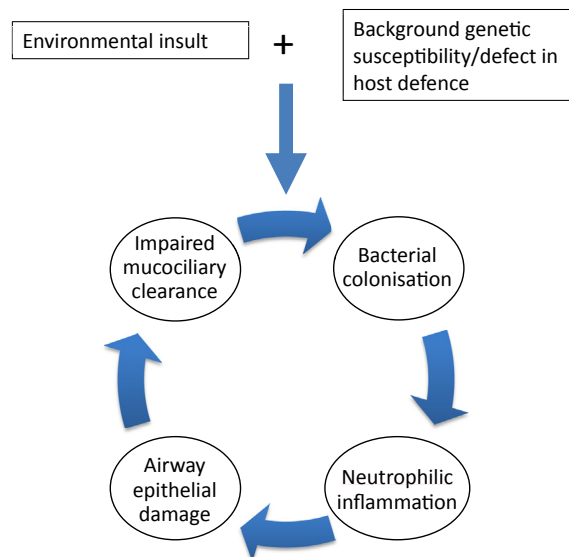


Fig. 1. Illustrating the ‘vicious circle’ hypothesis of bronchiectasis.

using lung function and regular sputum cultures, airway clearance techniques and antibiotic treatment. These principles are further outlined in Table 2 below:

2.2. Chronic bronchitis

Chronic bronchitis is defined as “the presence of a chronic productive cough for more than 3 months in 2 successive years” [29]. It is almost invariably described as a feature of Chronic Obstructive Pulmonary Disease (COPD) secondary to smoking [29].

2.2.1. Epidemiology

The prevalence of chronic bronchitis in the general population is unclear, with many estimates ranging from 3 to 7% of adults experiencing symptoms [30–35], although higher rates of up to 22% have been reported [36,37]. This uncertainty is likely owing to different definitions of the condition, variable reporting of symptoms and the inclusion of subjects in these estimates with other conditions such as bronchiectasis.

Table 1

Causes of Bronchiectasis in approximate order of frequency from most to least common. Based on data from Pasteur et al. [9] and Shoemark et al. [10].

Causes of Bronchiectasis
Idiopathic
Post Infectious
Immune deficiency
Allergic Bronchopulmonary Aspergillosis
Ciliary dysfunction
Rheumatoid arthritis
Gastroesophageal reflux disease/aspiration
Ulcerative Colitis
Cystic Fibrosis
Panbronchiolitis
Mycobacterial Infection
Congenital

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