

WHEEZING IN THE ELDERLY – DISTINGUISHING BETWEEN ASTHMA AND COPD

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ABSTRACT

Classically, asthma and chronic obstructive pulmonary disease present distinct clinical, physiologic and pathologic features. However, not infrequently, patients may present with overlapping clinical symptoms and physiological abnormalities: patients with severe asthma may present with fixed airway obstruction and patients with chronic obstructive pulmonary disease may have hyperresponsiveness and eosinophilia. At the pathological level, inflammatory and structural similarities also occur and may be related to the phenotypic overlaps. On the basis of such similarities in the inflammatory process, an argument can be made for a similar approach to treatment. However, both the response to treatment and the natural histories of the two diseases are quite different. While they share some common features, they can be distinguished in several important aspects.

SFP 2008; 34(3): 15-17

INTRODUCTION

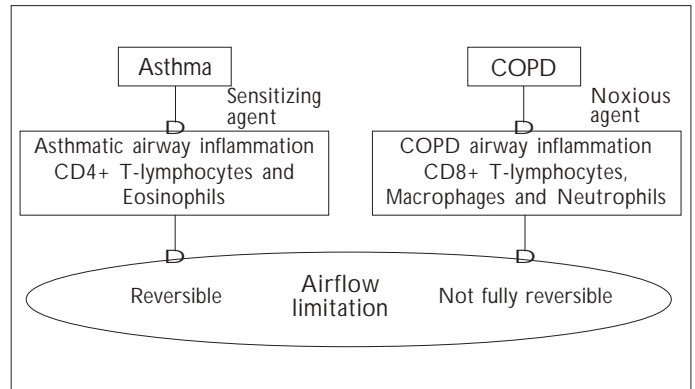
There are multiple causes of wheezing in the elderly. Typically, the issue facing the primary care physician managing patients with chronic wheezing is to distinguish between bronchial asthma and chronic obstructive pulmonary disease (COPD). Asthma and COPD are both characterized by the presence of airflow obstruction. Both diseases are not rare in the elderly population. Distinguishing between these diseases is difficult and may be impossible in some older patients.

PATHOPHYSIOLOGIC DIFFERENCES

Both asthma and COPD are characterized by underlying chronic airway inflammation. Nonetheless, the underlying airway inflammation is very different in these two diseases. In asthma, there is typically an eosinophilic infiltration of the airway wall and an increase in activated mast cells and CD4+ T lymphocytes. The inflammatory cells in COPD are mainly alveolar macrophages, neutrophils, CD8+ T cells. Figure 1 shows that, although the underlying airway inflammation is different, both these conditions are characterized by airflow limitation due to airway obstruction. There are also structural differences in the airways in these two conditions. In asthma, most of the inflammation is in the central airways, whereas in COPD it is mainly in the small airways. There is also more marked airway smooth muscle hypertrophy, thicker reticular basement membrane and increased bronchial vascularity in

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Figure 1. Asthma and COPD



asthma. Parenchymal involvement does not occur in asthma, but it is a major feature in COPD (emphysema). Notwithstanding the above, recent findings indicate that in patients with asthma, overlaps at inflammatory level exist with COPD, such as increased neutrophilia in patients with severe asthma or an association of CD8+ T cells and lung-function decline.¹ In chronic obstructive pulmonary disease, minimizing eosinophilia may be important to reduce exacerbations. Structural alterations occur in both diseases, but involving airway compartments differently. Airway epithelial changes, extracellular matrix deposition and mucus gland hypertrophy occur in both diseases.

CLINICAL DIFFERENCES

Evaluation and diagnosis of obstructive lung disease call for careful history taking to distinguish asthma from COPD. A history of atopy and intermittent reactive symptoms points toward a diagnosis of asthma, whereas smoking and a later age of presentation favors a diagnosis of COPD are more indicative of COPD. The clinical features that may help differentiate between COPD and asthma are shown in Table 1. Where diagnostic doubt still remains, or both COPD and asthma are present, determining if the airflow limitation is reversible or not may help and the following findings will help identify asthma²:

- κ A large response (FEV1 greater than 400 ml) to bronchodilators
- κ A large response (FEV1 greater than 400 ml) to 30 mg oral prednisolone for 2 weeks.
- κ Serial peak flow measurements showing 20% or greater diurnal or day-to-day variability.

The definition of COPD requires confirmation of persistent airflow obstruction after administration of a bronchodilator.³ Bronchoreversibility, however, cannot serve as an absolute criterion for separating asthma from COPD, as a significant

Table 1. Clinical features of bronchial asthma and COPD

	Asthma	COPD
Smoking history	Possibly	Nearly all
Symptoms < 35 years	Often	Rare
Chronic productive cough	Uncommon	Common
Breathlessness	Variable	Persistent/progressive
Nocturnal symptoms	Common	Uncommon
Diurnal variation of symptoms	Common	Uncommon
Atopy	Prominent	Absent

proportion of COPD patients may have significant improvement in FEV1 after a bronchodilator.⁴ On the other hand, documentation of complete bronchoreversibility is useful in excluding COPD, and a documentation of bronchoreversibility of a rise of FEV1 > 400 ml has been suggested to indicate such a reversibility. Similarly, a variation of 20% or greater diurnal or day-to-day variability is the level for documenting complete bronchoreversibility.⁴ Spirometry, which can be performed in the primary care setting, is the key diagnostic tool that distinguishes patients with asthma from patients with COPD. A suggested protocol for bronchodilator reversibility testing is shown in Table 2. Other investigations not readily available in primary care but can help distinguish asthma from COPD are: high-resolution CT scan of the lungs to look for emphysematous changes and hyperinflation, detailed lung function tests such as diffusing capacity, and evaluation of airway inflammation via induced sputum examination or tests of exhaled gas and vapours. These tests will not be discussed here.

In some patients with chronic asthma, a clear distinction from COPD is not possible using current imaging and physiological testing techniques. For instance, individuals with asthma who are exposed to noxious agents, particularly cigarette smoke, may develop fixed airflow limitation. Furthermore, there is epidemiologic evidence that longstanding asthma on its own can lead to fixed airflow limitation. In such cases, it may be assumed that asthma and COPD coexist and their management should be similar to that of asthma.³

Table 2. Bronchodilator Reversibility Testing

Preparation

- o Tests should be performed when patients are clinically stable and free from respiratory infection.
- o Patients should not have taken inhaled short-acting bronchodilators for 6 hours, long-acting bronchodilators for 12 hours, or sustained-release theophylline for 24 hours prior to the test.

Spirometry

- o FEV1 should be measured before a bronchodilator is given.
- o The bronchodilator should be given by metered dose inhaler through a spacer device or by nebulizer to be certain it has been inhaled.
- o Possible dosage protocols are 400 mcg beta2-agonist, up to 160 mcg anticholinergic, or the 2 combined. FEV1 should be measured again 10-15 minutes after a short-acting bronchodilator is given; 30-45 minutes after the combination.

DISTINGUISHING BETWEEN ASTHMA AND COPD: DOES IT MATTER?

There are hypotheses suggesting that both asthma and COPD may indeed share common origins with differences in phenotypic presentation being related to disease evolution or interaction between endogenous and exogenous factors. Others suggest that the two conditions are clinically and pathophysiologically distinct. Since it is now recognized that these two diseases have many common features, and in some clinical situations they are impossible to distinguish, some have argued that, at least for pragmatic reasons, to consider the two diseases as one. The arguments in favour of considering the two diseases on a continuum also extend to treatment. We tend to use the same drugs, with variations in emphasis. The goals of treatment are similar — to reduce symptoms, maintain lung function and normal activity, prevent exacerbations, reduce mortality and minimize the adverse effects of treatment.

In spite of their similarities, there are critical differences between asthma and COPD that, in my opinion, influence management and prognosis. The natural histories of COPD and asthma differ significantly. Patients with COPD experience an inexorable decline in lung function, and, as their airway obstruction worsens, exacerbations become more frequent. In contrast, patients with asthma may have frequent exacerbations without decline in lung function. A defining feature of asthma is spontaneous variability of airway obstruction, and patients are often symptomatic when they have near-normal lung function. Most patients with COPD do not become symptomatic or aware of impairment until the forced expiratory volume in 1 second (FEV1) has fallen to about 50% of the predicted value. This frequently delays their diagnosis and has critical consequences for their quality and quantity of life,^{5,6} partly because motivation to stop smoking is increased by recognizing its damaging effects. Patients with asthma do not normally experience lung function deterioration if they maintain regular anti-inflammatory medication, whereas patients with COPD continue to lose lung function despite medication. Once COPD is established, the only interventions that influence life expectancy are smoking cessation and oxygen therapy. By contrast, most patients with asthma have a normal life expectancy if they maintain regular preventive medication, and in older people, even those with severe asthma have a better outlook than those with COPD.⁷ Dyspnoea in patients with COPD is predominantly triggered by exertion, but in asthma there are usually many additional triggers, including allergens, cold air and non-specific irritants.

The end stages of COPD are characterized by the development of complications, particularly pulmonary hypertension and right heart failure. Many patients with COPD develop hypercapnia and respiratory failure. These are unusual outcomes for patients with asthma, even when there is severe airway obstruction, although comorbidities in both diseases may play an important role in determining outcome.

There are crucial differences in short-term and long-term responses to treatment. Objections to making a distinction between asthma and COPD are often made on the basis of the overlap in bronchodilator responses seen in both diseases. However, this occurs mostly in people with longstanding, poorly treated asthma or those in whom both diseases are present (“mixed disease”). Airflow limitation in COPD is not fully reversible. Although reversibility in response to bronchodilator may be significant and FEV1 may improve by more than 10%, the ratio between FEV1 and vital capacity (FEV1/VC) does not return to the normal range in COPD, as it usually does in newly diagnosed asthma. The accelerated loss of lung function that characterizes COPD, despite treatment, is not a common feature of asthma.

Choice of treatment also differs significantly, even though similar drugs are used in both diseases. There is strong evidence in asthma for an effect of low-dose inhaled steroids on exacerbations, quality of life, lung function, symptoms and mortality. In COPD, inhaled steroids do not affect lung function decline, and only high-dose inhaled steroids have been shown to affect exacerbation rate at the later stages of the disease. However, pulmonary rehabilitation has a significant impact on quality of life and exercise performance in patients with COPD.

Prognosis differs between the two diseases, particularly when FEV1 is less than 1 L. The risk of death from COPD is closely related to the degree of impairment of ventilatory function as expressed by FEV1. FEV1 also predicts the likely need for long-term oxygen therapy, the increasing frequency of exacerbations and hospital admissions, and the likely development of pulmonary hypertension.

CONCLUSIONS

While accepting the diagnostic difficulties inherent in assessing older patients with airway disease, there is merit in attempting to make a firm diagnosis where possible. Optimal

management of asthma and COPD must be based on distinctively different approaches that acknowledge the differences in presentation, disease progression and prognosis outlined above. Tailoring treatment to individual patients and assessing its benefits carefully will yield more specific management strategies, which will maximize quality of life, reduce adverse effects of medication, optimize physical function and better prepare patients for exacerbations and future events. Tailoring management strategies to meet individual patients’ needs should be the overriding consideration in achieving better outcomes for older patients with airway disease.

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LEARNING POINTS

- o Evaluation and diagnosis of obstructive lung disease in the elderly call for careful history taking to distinguish asthma from COPD.
 - o Both asthma and COPD are characterized by underlying chronic airway inflammation. Nonetheless, the underlying airway inflammation is very different in these two diseases.
 - o Although the underlying airway inflammation is different, both these conditions are characterized by airflow limitation due to airway obstruction.
 - o Determining if the airflow limitation is reversible or not may help and the following findings will help identify asthma.
 - o Spirometry, which can be performed in the primary care setting, is a key diagnostic tool that distinguishes patients with asthma from patients with COPD.
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