Airway obstructive diseases in older adults: From detection to treatment

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Asthma and chronic obstructive pulmonary disease occur commonly and may overlap among older adults. Smoking, air pollution, and bronchial hyperresponsiveness are the main risk factors. The treatment of these diseases in older adults does not differ from the available guidelines but may be complicated by the presence of comorbidities. Smoking cessation is essential for smokers, and pulmonary rehabilitation must be considered regardless of the age of the patient. (J Allergy Clin Immunol 2010;126:702-9.)

Key words: *Asthma, COPD, elderly, obstructive lung disease*

Abbreviations used

BHR: Bronchial responsiveness
COPD: Chronic obstructive pulmonary disease
FVC: Forced vital capacity
GOLD: Global Initiative for Chronic Obstructive Lung Disease
ICS: Inhaled corticosteroid
LABA: Long-acting β-agonist agent
TORCH: Toward a Revolution in COPD Health
UPLIFT: Understanding Potential Long-Term Impacts on Function with Tiotropium

All diseases run into one, old age.

—Ralph Waldo Emerson

Chronic obstructive pulmonary disease (COPD) is an important cause of morbidity and mortality worldwide. The World Health Organization estimates that COPD will become the fifth most prevalent disease in the world and the fourth leading cause of worldwide mortality by the year 2020.[1,2]

Considerable overlap exists between asthma and COPD, and this overlap can be particularly challenging to disentangle in elderly populations. Asthma, traditionally described as an allergic disease that develops in childhood, is characterized by the presence of reversible airflow obstruction. In contrast, COPD, largely related to tobacco smoking, develops later in life and is characterized by the presence of incompletely reversible or irreversible airflow obstruction and accelerated lung function decline. Although the clinical features of these diseases help us to differentiate between them in most patients, the spectrum of obstructive lung diseases seen in clinical practice is more complex, particularly among the elderly, who may have components of both diseases (Table I).

The growing burden of obstructive lung diseases appears to be caused, at least in part, by the aging of the world's population. The World Health Organization estimates that between the years 2000 and 2050, the proportion of persons over 65 years of age is expected to more than double, representing up to 17% of the total world population.[3] The definition of "older person" or "elderly" is imprecise, although most developed world countries consider the chronologic age between 60 to 65 years of age to define the lower limit for an "older" adult.

The prevalence estimates of obstructive lung diseases in the elderly is complicated by several sources of bias.[4] For example, COPD prevalence increases with aging, with an estimated prevalence of 20% to 30% in patients >70 years of age.[5] In the case of asthma, the prevalence in the elderly is also high, with studies showing asthma affecting >10% of patients >60 years of age.[6]

Our understanding of obstructive pulmonary diseases has evolved in recent years. For example, we now recognize that both asthma and COPD are characterized by lung function changes, and evidence suggests they both share pathophysiologic alterations similar to the natural aging process in the lungs, including mechanisms of inflammation, cellular senescence, and apoptosis (leading into irreversible airway disease).[7] It is not surprising, then, to note that the morbidity and mortality of both COPD and asthma increase with advancing age.

Despite a high prevalence, COPD remains underdiagnosed. Moreover, the existence of overlap syndromes of asthma, COPD, and other lung diseases in some patients complicates the ascertainment of prevalence in the general population. It is likely that current prevalence estimates largely underestimate the true burden of both diseases, particularly in the elderly population.

This review summarizes the epidemiology and diagnosis of COPD in older adults, with specific emphasis on common features and differences between COPD and asthma, and provides a brief overview of the different treatment strategies used in this population.

DEFINITIONS

The definition COPD has evolved in the last decade. The Global Initiative for Chronic Obstructive Lung Disease (GOLD) defined COPD as a preventable disease with extrapulmonary

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TABLE I. Differentiating features of COPD and asthma

	COPD	Asthma (early-onset)	Asthma (late-onset)	Overlap syndrome
Onset	Mid life	Early life	65 y or older	May have history of asthma in early life
Risk factors	Smoking	Atopy, airway hyperresponsiveness	Atopy, irritant exposures	Smoking, aging
Symptoms	Slowly progressive	Intermittent, worse at night/morning	Intermittent, poor perception of symptoms	Slowly progressive
Family history	May be present	Frequently present	May be present	May be present
FEV_1/FVC ratio	<70%	≥70%	<70%	<70%
FEV_1% predicted	<80%	>80%	<80%	<80%
Bronchodilator response	Absent	Present	Present	Absent

effects characterized by progressive airflow limitation that is not fully reversible associated with an abnormal inflammatory response.[8] This contrasts with the earlier definition of COPD (American Thoracic Society) that required the presence of chronic bronchitis (determined clinically) or emphysema (determined pathologically) to confirm a diagnosis.

In clinical practice, the definition of COPD is not straightforward, particularly in older adults. For example, COPD includes a heterogeneous group of clinical manifestations and diverse disease phenotypes (ie, emphysema, chronic bronchitis), sometimes characterized by the presence of partially reversible airflow obstruction, whereas long standing asthma often leads to airway remodeling and partly irreversible airflow obstruction,[9] making the differentiation between these 2 entities difficult clinically. In addition, there can be overlap with other disease processes such as bronchiectasis, bronchiolitis, interstitial lung disease, and congestive heart failure.

SPIROMETRY IN OLDER ADULTS

Spirometry is necessary to establish the presence of airflow obstruction and to classify the severity of the obstructive defect in COPD. Guidelines for standardization and interpretation of pulmonary function tests are widely available, and in the majority of adult subjects, acceptable and repeatable spirometric maneuvers can be achieved. Nevertheless, several pitfalls must be considered when performing and interpreting spirometry in the elderly.

Interpretative problems

1. Studies have shown that "healthy" elderly subjects develop physiological changes that resemble the presence of airflow obstruction.[10] Aging is associated with a decline of forced vital capacity (FVC) and FEV_1 by 15 to 30 mL/y, and the decline in FEV_1 often exceeds the reduction in FVC, resulting in a decline in the predicted values and lower limit of normal. Using a fixed cutoff value (<70%), as is recommended by GOLD, potentially results in overestimation and misclassification of obstructive lung disease in older adults. The American Thoracic Society/European Respiratory Society pulmonary function test interpretation guidelines recommend that the lower limit of the normal range for FEV_1/FVC ratio, based on the fifth percentile corrected for age, sex, height, and race, be used to detect airflow obstruction.[11] Conversely, though, the prevalence and morbidity of obstructive lung diseases increase with aging.
2. Use of inappropriate reference equations may result in misclassification of disease: the majority of reference equations used in older adults have been extrapolated from studies that failed to include subjects >65 years of age.[10]

Technical barriers

1. Spirometry requires performance of unusual and athletic-type breathing maneuvers. Older patients may find it difficult to perform these, and submaximal efforts may lead to interpretation misclassification. Nevertheless, reports suggest that 50% to 90% of older adults achieve standard goals for test session quality.[12,13]
2. Good quality testing from a elderly patient may require 20 to 30 minutes more than the time required for younger subjects.[13]
3. The minimum number of FVC maneuvers needed to achieve consistent results is higher in older adults (up to 5-8 maneuvers required).[12]
4. Older patients have difficulty achieving end-of-test thresholds and are frequently unable to exhale 20 seconds.[14] For this reason, some have advocated using slow vital capacity maneuvers or the measurement of the FEV_1/forced expiratory volume in 6 seconds ratio to detect airflow obstruction.

EPIDEMIOLOGY

Disease burden

The prevalence of COPD in the general population increases with age. The Burden of Obstructive Lung Disease initiative reported the prevalence of COPD in different parts of the world (n = 9245). The prevalence of GOLD-defined COPD stage II (FEV_1/FVC ratio <0.70 and FEV_1 <80% of the predicted value) or higher was 11.8% for male and 8.5% for female subjects. The study also showed an increased risk of COPD that approximately doubled for each 10-year age increment over the age of 40 years.[15] The prevalence was higher in smokers than in nonsmokers and increased with the intensity and duration of smoking. In a subgroup analysis of this study, the highest prevalence of COPD was found in patients >70 years of age, with a prevalence of 22.3% in men and 25% in women.[16] Similarly, a study in Sweden described an increase in prevalence from 17.1% at 61 to 62 years of age to 28.7% at 76 to 77 years of age.[17] In a cohort study of general adult population in Norway, the incidence of COPD was highest in the oldest age cohort: among subjects age 60 to 74 years at baseline, 18.8% developed COPD during the study versus 9.6% for those age 45 to 59 years.[18]