



Review Article

Diagnosis and management of asthma in the elderly

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ABSTRACT

Bronchial asthma is one of the most common chronic diseases worldwide, and by definition not expected to recover with aging. However, the concept that asthma can affect older individuals has been largely denied in the past. In clinical practice, asthma that occurs in the most advanced ages is often diagnosed as COPD, thus leading to undertreatment or improper treatment. The heterogeneity of clinical and functional presentation of geriatric asthma, including the partial loss of reversibility and of the allergic component, contributes to this misconception. A large body of evidence has accumulated demonstrating that the prevalence of asthma in the most advanced ages is similar to that in younger ages. The frequent coexistence of comorbid conditions in older patients compared to younger asthmatics, together with age-associated changes of the human lung, may render the management of asthma a complicated task. The article addresses the main issues related to the diagnosis and treatment of asthma in the geriatric age.

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1. Introduction

A 78-year-old, never smoker female went to the emergency room for worsening dyspnea that had been preceded by fever with body temperature up to 38 °C. Chest physical examination revealed diffuse wheezing, rhythmic tachycardic heart sounds, and no peripheral edema. The chest X-ray was negative for parenchymal or pleural lesions; the arterial blood gas analysis showed partial respiratory failure with pH 7.41, PaO₂ 54 mm Hg, and PaCO₂ 39 mm Hg, on room air. Blood tests showed high levels of inflammatory markers and mild leukocytosis with a predominance of neutrophils. Among the anamnestic data, the patient reported several episodes of bronchitis and allergic reactions to some unspecified drugs. The son of the patient reported multiple sensitizations to aeroallergens. Of note, she suffered from depression and arterial hypertension, for which she was not assuming any treatment, and diffuse arthritis of the hands. The patient was admitted in the Department of Pulmonology with a diagnosis of acute exacerbation of chronic obstructive pulmonary disease (COPD).

She was treated with broad-spectrum antibiotics, systemic corticosteroids and inhaled bronchodilators with rapid resolution of respiratory failure and bronchospasm. However, the clinical course of the first days of hospitalization was characterized by several episodes of acute dyspnea associated with bronchoconstriction, which however were not properly described, thus postponing the extemporaneous therapy with bronchodilators and intravenous corticosteroids. In the following

days, she developed hyperglycemia, and had to be treated with subcutaneous insulin.

The clinical course improved after 10 days. Pulmonary function tests performed just before discharge (during bronchodilator therapy) showed moderate obstructive ventilatory defect. The patient was discharged with inhaled therapy including inhaled corticosteroids (CSI), long acting beta-2 adrenergics (LABA) and long acting muscarinic antagonists (LAMA). On subsequent outpatient visits, pulmonary function tests were repeated and showed improvement with mild obstructive defect after one month, forced expiratory volume in 1 s (FEV₁) % predicted was within normal limits after three months.

The case presented describes a typical presentation of bronchial asthma in later life. It is worth noticing that the respiratory symptoms in the elderly often lead to an erroneous diagnosis of COPD and management if usually complicated by the occurrence of comorbid conditions. Some information from the medical history (including allergic diathesis and the absence of cigarette smoking exposure), together with the reversibility of bronchial obstruction, allowed abandoning the hypothesis of COPD in favor of bronchial asthma.

In this review we describe the cardinal features of asthma in the elderly, and address the main aspects that should be taken into account when approaching an elderly individual complaining of symptoms suggestive of asthma.

1.1. Is asthma a rare disease in the elderly?

Our patient presented with symptoms that were interpreted by the physicians as clinical manifestations of COPD, although she had never smoked and had not referred a previous diagnosis of chronic bronchitis. This is because a common belief attributes to asthma the definition of

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“rare” disease when occurring in the geriatric age. One of the issues is related to the definition of “elderly”: the majority of the epidemiological as well as clinical studies that are described in this review agree on the cut-off value of 65 years of age. Indeed, this age group is the fastest growing proportion of the first world population, expecting to represent up to 17% of the total world population in 2050 [1]. The precise prevalence of asthma in the elderly is difficult to ascertain. This is due to the current absence of universal criteria for the diagnosis in this age group, which are mainly related to the heterogeneity of the clinical and functional presentations of the disease in this population, including the partial loss of reversibility, and the poor perception of symptoms by the patients [2]. A large body of evidence has accumulated in recent years confirming that the prevalence of asthma in the most advanced ages is similar to that in younger ages. Several studies in the European and U.S. populations showed that asthma is common among the elderly: its prevalence among people aged over 65 years ranges from 1.8% to 10.9%, with the highest rates in males and with a slight increase over time [3–14]. The estimated incidence of asthma in the elderly is about 95 per 100,000 subjects, with a reduction from 103 per 100,000 in subjects aged 65–74 years to 58 per 100,000 in those aged >85 years [15]. Older asthmatics have the highest mortality rate (51.3 per million people) of any other age group [16]. Bellia et al. [17] demonstrated that asthma in the elderly was associated with a higher mortality rate compared to that in control subjects (24.3% vs. 16.3%, respectively).

1.2. What are the features of elderly asthmatic patients?

Our patient presented with acute dyspnea, which is a common denominator of several respiratory diseases. Indeed, asthma in the elderly often overlaps with a variety of structural and functional changes associated with the physiological aging of the respiratory system, as well as with many diseases that are common in advanced age. Elderly subjects suffering from asthma can be divided at least into two groups (Table 1): patients with a longstanding asthma, and those in whom the symptoms occur later in life (after the age of 65 years) [18]. Studies have demonstrated that patients with a longstanding disease, contrary to those with late-onset asthma, have worse and more frequent respiratory symptoms, increased number of hospitalizations and emergency medical interventions, and lower values of spirometric parameters [19,20]. Indeed, patients with long-standing asthma tend to have more severe and irreversible, or partially reversible, airway obstruction than those with late onset asthma [21,22]. Asthmatic subjects were demonstrated to be differently affected by obesity based on whether their asthma occurred early (<12 years of age) or later in life [23], a significant association between increasing BMI and duration of asthma only occurring in early-onset asthma, potentially affecting the response to treatment.

On the other hand, a higher annual decrease in FEV₁ is observed in patients with newly diagnosed disease [24], and in patients with early-onset non-atopic asthma, which represents the main phenotype in elderly subjects [25]. Atopy seems more frequent in patients with early-onset asthma than in those with late-onset disease. The question is whether atopy per se affects the asthmatic phenotype in this population. In the Normative Aging Study [26], the role of the allergic response to environmental aeroallergens in the development of asthma in older men was assessed. Subjects in whom airway hyperresponsiveness on

methacholine challenge occurred had a higher prevalence of serum IgE reactivity to cat allergen and *Dermatophagoides* when compared to normoreactive individuals. Older individuals spend more time in the same indoor environment compared with younger adults, and it is conceivable that the impact of environmental control, particularly for indoor allergens (mites, molds, pets and cockroaches), will be higher in this age group. Although available data seem to favor the decline of allergen sensitization with age, the prevalence of allergic sensitizations in the elderly population with respiratory symptoms is substantial enough to warrant evaluation of the atopic condition [27]. The identification of an allergic component of asthma in the elderly patient may influence treatment. Indeed, the recognition of allergens as possibly responsible for the respiratory condition allows preventive environmental strategies to be applied, and allergen specific immunotherapy with effective adjuvants to increase the immune response while reducing the risk of systemic reaction to be conducted.

Breathlessness is the most common presenting symptom; it has been reported that 48% of asthmatics in older ages recall the onset of respiratory symptoms before 40 years of age [28]. Nevertheless, symptoms are often not properly attributed to asthma for a period of time, as in the case reported, in which the exacerbations of asthma were interpreted as episodes of acute bronchitis. In the context of the S.A.R.A. Study [29] only 50% of the elderly patients with carefully ascertained asthma had received a correct diagnosis; conversely, 20% of the study sample reported an erroneous diagnosis of COPD and/or emphysema and, even more worrying, more than 27% of the asthmatics had never received any diagnosis of respiratory diseases. In addition to dyspnea, cough can represent a relevant symptom but rarely is the only presenting one. Cough efficacy may be markedly reduced in the elderly because of age-related or comorbidity-related impairment of both motor and sensory components [30].

Accumulating evidence shows that in a not trivial proportion of elderly subjects, a coexistence of asthma and chronic bronchitis may occur [31], suggesting the occurrence of an overlap phenotype. In addition, the concomitant occurrence of bronchiectasis is associated with more severe asthma, more frequent hospitalizations due to asthma exacerbation and more frequent occurrence of chronic respiratory failure. Finally, air pollution has been shown to significantly correlate with increased emergency room admissions for asthma in elderly asthmatic patients, mostly in subjects aged more than 65 years, even in warm seasons [32].

1.3. How to diagnose asthma in advanced ages

Our patient was erroneously diagnosed as affected by COPD. This usually occurs because of a cultural bias that associates asthma to childhood and adolescence. Asthma in the elderly is frequently underdiagnosed and as a result, undertreated [29,33]. The main task in establishing the diagnosis in advanced ages is to distinguish asthma from COPD. Indeed, both diseases are characterized by chronic bronchial inflammation and by an obstructive functional pattern [34]. Some of the diagnostic mistakes are due to the erroneous concept that airway obstruction in young ages invariably suggests the occurrence of asthma, while the same spirometric findings in older adults are usually attributed to COPD, even in the presence of reversibility of the obstruction and in subjects without smoke exposure [35]. Conversely, it has been observed that patients over 64 years old, hospitalized with a diagnosis of asthma, frequently received a diagnosis of COPD in the following hospitalizations [36]. Age per se appears to be the main confounding factor in the differential diagnosis between asthma and COPD; this is further highlighted by the fact that elderly patients often do not perceive (and properly describe) chest tightness associated with bronchospasm, as it occurred in our patient, and tend to adopt a sedentary lifestyle that contributes to the subjective underestimation of respiratory symptoms [29,33,36–38].

Table 1
Main clinical and functional differences between early and late onset asthma.

	Early-onset asthma	Late-onset asthma
Atopy	+++	+
Symptoms	+++	+
Pulmonary function impairment	+++	+
Annual decline in FEV ₁	+	+++
Obstruction reversibility	++	+++
AHR	++	++

AHR: airway hyperresponsiveness; FEV₁: forced expiratory volume in 1 s.

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