Asthma in the Elderly

a report by
Sidney S Braman, MD, FACP, FCCP

Division of Pulmonary and Critical Care Medicine, Brown Medical School and Rhode Island Hospital

Asthma is a common disease in the general population, with an overall prevalence in the US in 2002 of 7% reported by the National Center for Health Statistics.[1] It is caused by a complex interaction of inflammatory cells, mediators, and cytokines, which can induce bronchoconstriction and, as a result, airflow obstruction.[2] This is a cardinal feature of asthma at any age. There is a common misperception that asthma is predominantly a childhood disease. However, in a survey of elderly persons from four communities in the US, the prevalence of physician-diagnosed asthma was 4%, with another 4% having probable asthma (symptoms of asthma without a diagnosis).[3] This is similar to other estimates that 7–9% of individuals over the age of 70 have asthma. New-onset asthma is most common in childhood, but it may occur at any age, even in the eighth and ninth decades of life. It is often under-recognized or misdiagnosed in the elderly. A proper evaluation of asthma symptoms can lead to early diagnosis, proper treatment, and avoidance of unnecessary emergency department visits and hospitalizations.[4,5]

The Diagnosis of Asthma in the Elderly

Unfortunately, the diagnosis of asthma is frequently overlooked in the geriatric population. Some elderly patients are reluctant to admit their symptoms, or consider them a result of normal aging. Under-reporting of symptoms in the elderly may have many causes, including depression, cognitive impairment, social isolation, denial, and blaming of symptoms on other comorbid illnesses. Even when symptoms are reported, lung function testing to confirm the diagnosis is often not carried out.[6]

On the other hand, the diagnosis of asthma is frequently confused with chronic obstructive pulmonary disease (COPD),[7] a disease usually, but not always, associated with cigarette smoking. Both are associated with symptoms of shortness of breath, wheezing, cough, sputum production, and airflow obstruction on pulmonary function testing. In one study of a group of elderly asthmatic patients (mean age of 73 years), only 53% of patients had been correctly identified as having asthma. Furthermore, 19.5% of patients were given the wrong diagnosis of COPD.[7] These patients were more likely to have their onset of symptoms later in life and have greater degrees of disability.

The presence of airflow obstruction can be confirmed by spirometry showing a reduced forced expiratory volume in one second (FEV_1) and ratio of FEV_1/forced vital capacity (FVC). A ratio of less than 70% increases the probability of asthma in an elderly patient with asthma symptoms. A brisk response to a short-acting bronchodilator may demonstrate the second cardinal feature of asthma: reversible airflow obstruction ('a responder'). When airflow obstruction is found in an elderly patient, attempts should be made to demonstrate reversibility following the inhalation of a short-acting beta adrenergic agent such as albuterol. Age is not a significant predictor of the acute bronchodilator response in asthma. Using American Thoracic Society (ATS) criteria (the post-bronchodilator FEV_1 increases by more than 12% and 200cc), the probability of asthma is significantly increased. Some experts feel this confirms the diagnosis of asthma.[8] While the response to an inhaled bronchodilator is generally greater with asthma (16 versus 11%), many patients with COPD will also meet the ATS reversibility criteria on any given testing day. However, this response may not persist—52.1% of patients will change 'responder' status between visits.[9] This makes the test less than reliable to confirm the diagnosis of asthma.[10,11] If complete reversibility of airflow obstruction is documented, COPD, a disease of fixed airway obstruction, is excluded. A brisk post-bronchodilator response enhances the post-test probability of asthma.

A negative bronchodilator response to a short-acting beta agonist, on the other hand, does not rule out a diagnosis of asthma. Population studies have shown that as many as 30% of patients with fixed airflow obstruction have a past history of asthma.[12] Often, treatment over time will improve lung function and, when documented by spirometry, a diagnosis of asthma can be confirmed. Measurements of the FEV_1 over time may offer the best way of making the diagnosis.

Sidney S Braman, MD, FACP, FCCP, is Professor of Medicine and Division Director of Pulmonary and Critical Care Medicine at Brown Medical School. He is Director of the Division of Pulmonary, Sleep, and Critical Care Medicine at the Warren Alpert Medical School of Brown University and the Rhode Island Hospital. He is the former President of the American College of Chest Physicians and a Fellow of the American College of Physicians and the American College of Chest Physicians. He is a former board member of the American Thoracic Society, and was Chairman of its Clinical Problems Assembly and International Conference Committee. He served as President of the staff association and a member of the Board of Trustees of the Rhode Island Hospital. Dr Braman has served as President of the Friends of the Haffenreffer Museum of Anthropology at Brown University and Chairman of the Long Range Planning and Development Committee. Dr Braman is a reviewer for *Journal of the American Medical Association*, *Chest*, *American Journal of Respiratory and Critical Care Medicine*, *Respiratory Medicine*, and *European Respiratory Journal*. He is author or co-author of more than 80 publications. He received the Milton W Hamolsky Rhode Island Hospital House Officers Association Teaching Award in Medicine, the Brown University Program in Medicine's Senior Class Teaching Award, and the Senior Medical Citation. Dr Braman completed fellowships at the University of Pennsylvania and the Walter Reed Army Medical Center, and a residency and internship in internal medicine at Philadelphia General Hospital. He received his medical degree from Temple University School of Medicine in Philadelphia, and his Bachelor degree from Franklin and Marshall College. Dr Braman attained the rank of Major while serving in the US Army Medical Corps.

E: sidney-braman@brown.edu

Fixed Airflow Obstruction in Elderly Asthmatics

In addition to bronchoconstriction, causes of airflow obstruction are mucous plugging, bronchial wall edema, inflammatory cell infiltration, airway smooth muscle hypertrophy, and subepithelial fibrosis. All of these architectural changes are collectively referred to as 'airway remodeling.' While some of these changes may be reversible with treatment, at some point they may become permanent, and this results in fixed airflow obstruction.

There is growing evidence that the airway function of young and middle-aged asthmatics declines at a greater rate than that of normal subjects.[13] The rate of decline increases with increasing age and in those who smoke cigarettes. These effects are variable since not all individuals show a steeper rate of decline. A longer duration and severity of previous asthma are also important factors.[14,15] In one random survey of 1,200 elderly asthmatics over the age of 65 years, only one in five patients had normal pulmonary function (FEV_1 >80% predicted), while a similar number showed moderate to severe airflow obstruction (FEV_1 <50% predicted) after an inhaled short-acting bronchodilator.[16] Since structural changes of emphysema are minimal in elderly asthmatics, airway remodeling is thought to be the main cause of fixed airflow obstruction.[17]

While distinguishing asthma from COPD may be very challenging, there are features seen in elderly asthmatics with fixed airflow obstruction that are distinct from COPD caused by cigarette smoking. When compared with patients with COPD of similar age, they have significantly more eosinophils in the peripheral blood, sputum, and bronchoalveolar lavage (BAL), and on bronchial biopsy have higher numbers of neutrophils in the sputum and BAL, have higher ratios of CD4+/CD8+ T cells infiltrating the airway, and have greater thickness of the airway basement membrane than patients with COPD.[18] Other distinguishing features include higher levels of exhaled nitric oxide, lower emphysema scores on high-resolution computed tomography (CT) scans, and higher diffusing capacities. Since many of these tests are impractical, not available for widespread use, or not discriminatory enough for clinical use, the most recent American Thoracic Society (ATS)/European Respiratory Society (ERS) Statement on COPD stated: "Some patients with asthma cannot be distinguished from COPD with the current diagnostic tests. The management of these patients should be similar to that of asthma."[19]

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While the main diagnostic challenge with asthma in the elderly is distinguishing it from COPD, many current or former smokers have both asthma and COPD. Also, asthma in the elderly may be mimicked by, and often confused with, other diseases, such as congestive heart failure, chronic aspiration, gastroesophageal reflux, and tracheobronchial tumors.[20]

Treatment of Asthma in the Elderly

There are both short-term and long-term therapeutic objectives for every asthmatic patient, recommended by the National Heart, Lung, and Blood Institute (NHLBI).[21] Short-term objectives are the control of immediate symptoms and improvement in lung function. Long-term objectives are those directed to disease prevention and avoidance of emergency room visits and hospitalizations. In order to meet these therapeutic objectives, four components of asthma care should be addressed.

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The first of these is monitoring lung function with peak flow meters and/or office spirometry, which is essential in caring for many elderly asthmatics. Older patients with asthma have been shown to deteriorate for longer periods prior to hospital admission for severe acute asthma than younger patients. For example, twice as many elderly patients will show worsening symptoms for more than 14 days before hospital admission compared with a group of younger patients. One reason for this delay may be the blunted perception of breathlessness that has been found in the elderly compared with younger patients.[22]

The second component—treatment of asthma with bronchodilator and anti-inflammatory medication—is initially tailored to the patient's needs, and relies on an international staging system of 'asthma severity,' which is based on symptoms and objective measures of lung function.[21] Inhaled corticosteroids are the preferred anti-inflammatory agent, and are given to those patients who have asthma symptoms and require a short-acting beta agonist for rescue therapy more than twice a week. Monitoring the response to treatment by an assessment of 'asthma control' will be incorporated into the new NHLBI guidelines, as they are in the new Global Initiative for Asthma (GINA) Guidelines.[23]

Third, measures should be taken to avoid respiratory irritants that can cause worsening of symptoms. This third cardinal feature of asthma, bronchial hyper-responsivenes, can be demonstrated as an exaggerated bronchoconstrictive response of the airways to a variety of stimuli, such as aeroallergens, histamine, methacholine, cold air, and environmental irritants. Important provocative factors in the elderly include viral respiratory infections, respiratory irritants, and beta adrenoreceptor antagonists (beta-blockers), which are commonly used in this age group for ischemic heart disease, arrhythmias, and hypertension.

Finally, patient education can be a powerful tool in asthma control. Family members can also be helpful, especially with elderly adults. Active participation by a patient in monitoring lung function, avoiding provocative agents, and making decisions regarding medications provides asthma management skills that give a patient the confidence to control his or her own disease.

Medication for Asthma

The medications used to treat the elderly asthmatic are the same as those used to treat younger patients. Inhaled short-acting beta$_2$ adrenergic agonists are the treatment of choice for the acute exacerbation of asthma symptoms. They can be delivered by metered-dose inhaler (MDI) and compressor-driven nebulizers. Unfortunately, many elderly patients are unable to use the MDI properly, even after proper instruction. Inadequate timing of actuation and inhalation is the most frequent error made. Impaired mental function, weakened or deformed hands, and motor or musculoskeletal diseases are other reasons for inadequate MDI use. Despite the minimal systemic absorption seen with the beta agonists, tachycardia and tremor may be observed. While they have been proved to be safe and effective in all age groups, the relative risks for adverse cardiovascular events is high, and caution should be used with these agents in those patients with underlying cardiac conditions.[24]

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Long-acting beta$_2$ agonists such as salmeterol and formoterol are helpful for long-term maintenance therapy, and should be used in conjunction with an inhaled corticosteroid to improve asthma control.

The goal of asthma therapy is always to control the disease without systemic steroids. Inhaled corticosteroids are safe and effective treatment for elderly asthmatics. They can reduce airway inflammation after several months of treatment, but long-term treatment is usually necessary. Long-term use of inhaled corticosteroids has been associated with a good safety profile. They are not associated with an increased risk of fractures at standard doses. High doses of inhaled steroids (>1000mcg per day) are capable of causing hypophyseal-pituitary-adrenal (HPA) axis suppression and systemic complications. Local adverse effects, such as hoarseness, dysphonia, cough, and oral candidiasis, do occur, but can usually be avoided by the use of a spacer or holding chamber.

Prognosis

Longitudinal studies of asthmatic populations have shown that remission from asthma is uncommon in older age groups, occurring in about 20% of patients. Elderly asthmatics with severe symptoms, long-standing disease, reduced pulmonary function, or a concomitant diagnosis of COPD are much less likely to have a remission. The risk for hospitalization in the asthmatic over the age of 65 doubles compared with younger patients, especially for women and non-whites.[25] In one study, the risk of re-hospitalization was 23% after one year, and 12% of patients died.[26] Asthmatics over the age of 65 years account for 60% of asthma-related deaths overall, and black females aged 65 years and older have the highest crude asthma mortality rates.[27] Despite the at times severe symptoms and physiological impairment, most elderly patients with asthma can lead active productive lives with the use of appropriate therapy.[5] ■

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