

World Allergy Congress 2015 Symposium: Allergic Diseases in the Elderly

Epidemiology and Clinical Features of Asthma in the Elderly

Heung-Woo Park, M.D., Ph.D.

guinea71@snu.ac.kr, guineapark@yahoo.com

Department of Internal Medicine,

Seoul National University College of Medicine,

Seoul, Republic of Korea

Learning Objectives

- Epidemiological importance of elderly asthma
- Clinical features differentiating elderly asthma from non-elderly asthma
- Clinical features predicting an acute exacerbation in elderly asthma

Content Description

Elderly asthma usually refers to asthma in people aged 65 years and over. Although we are in an era of declining overall asthma mortality, mortality remains high within this particular population. Aging is accompanied with changes in respiratory physiology and immunology. Therefore, elderly asthmatics (EA) are thought to be distinct from non-elderly (i.e. young) asthmatics (hereafter NEA) and the differences cannot be fully explained by chronological age alone. There are important gaps in the current state of knowledge regarding the natural history and exacerbation of asthma in elderly people. To reduce these gaps, we established a prospective, observational, multicenter cohort with 5-year (2009-2013) follow-up. In this presentation, we will show clinical features differentiating EA from NEA and predicting an acute exacerbation in EA which were learned from our large cohorts

1. Differences between asthma in young and elderly: Results from the COREA study (*Respir Med 2013;107:1509-14*)

We performed principal component analysis (PCA) using 2,067 asthmatics (434 EA and 1,633 NEA) from the Korean Cohort for Reality and Evolution of adult Asthma. Eleven clinical variables measured at the enrollment were used for PCA; symptom score, symptom duration, number of exacerbation during previous one year, smoking pack year, number of controller medications,

body mass index, predicted % of FEV1, predicted % FVC, post-bronchodilator FEV1/FVC ratio, atopy index and number of eosinophils in peripheral blood. PCA of all asthmatics showed that EA and NEA were distinctly separated by the first and second principal component on the plot of individual asthmatics according to their scores. For further analysis, we divided all asthmatics into the EA and the NEA group and performed PCA again in each group. The first four principal components with eigenvalues > 1.0 were identified in both groups and they explained 55.5% of the variance in the EA group and 52.4% in the NEA group respectively. Clinical variables showed distinctly different patterns of loading on the first four principal components between the EA and the NEA group. EA and NEA have different compositional patterns underlying their clinical variables. These observations helped in understanding the differences between EA and NEA from the integrated view covering various clinical aspects.

2. Prediction of asthma exacerbations in elderly: results of a one-year prospective study (*J Am Geriatr Soc 2013;61:1631-2*)

This report is the result of the first year of our prospective EA cohort. The goal of the present study was to search for important variables in predicting future exacerbations. Individuals aged 65 and older with asthma were recruited from nine centers in Korea. The diagnosis of asthma was made when a positive bronchodilator response or a 12% or greater improvement in FEV1 after anti-asthmatic treatments was proven. An asthma exacerbation was defined when one of the following criteria was satisfied: use of systemic corticosteroids or an increase from a stable maintenance dose for at least 3 days, asthma-specific unscheduled visits, and emergency department visits or hospitalization. Variables known to be associated with asthma exacerbations were evaluated: sex, age, asthma control status, body mass index, smoking status, atopy, medication adherence, and history of previous exacerbations. Six hundred twenty-eight EA were enrolled and among them 137 (21.8%) experienced one or more exacerbations. Baseline characteristics according to the presence of exacerbations were not different. Logistic regression methods showed that depression (measured by the Korean version of the Geriatric Depression Scale Short Form), inhaler technique, and adherence were negatively associated with exacerbations in EA and that history of previous exacerbations was positively associated.

3. Xenon ventilation computed tomography and the management of asthma in the elderly (*Respirology 2014;19:389-95*)

Treatment-naïve EA were recruited. Before initiation of medication, spirometry with bronchodilator (BD) reversibility, questionnaires to assess the severity of symptoms including a visual analogue scale (VAS), tests to evaluate cognitive function and mood, and xenon ventilation CT were performed. Xenon gas trapping (XT) on xenon ventilation CT represents an area where inhaled xenon gas was not expired and was trapped. Symptoms and lung functions were measured again after the 12-week treatment. A total of 30 EA were enrolled. The severity of dyspnoea measured by the VAS showed a significant correlation with the total number of areas of XT on the xenon

ventilation CT taken in the pre-BD wash-out phase ($r = -0.723$, $P < 0.001$). The total number of areas of XT significantly decreased after BD inhalation, and differences in the total number of areas of XT (between the pre- and post-BD wash-out phases) at baseline showed significant correlations with the per cent increases in FEV1 after subsequent anti-asthma treatment ($r = -0.775$, $P < 0.001$). Xenon ventilation CT may be an objective and promising tool in the measurement of dyspnoea and prediction of the treatment response in elderly asthmatics.

4. Classification of elderly asthma phenotypes and its implementation (*in submission*)

We applied k-means cluster to 872 EA in a prospective, observational, and multi-centered cohort. Acute asthma exacerbation data collected over the prospective follow-up of two-year was used to evaluate clinical trajectories of these clusters. Subsequently, a decision-tree algorithm was developed to facilitate implementation of these classifications. Four clusters of EA were identified: (i) long symptom duration and marked airway obstruction; (ii) female dominance and normal lung function; (iii) smoking male dominance and reduced lung function; and (iv) obese and borderline lung function. Cluster grouping was strongly predictive of time to first acute asthma exacerbation (log-rank $P = 0.0105$). The developed decision-tree algorithm included two variables (FEV1 pred.% and smoking pack years), and its efficiency of proper classification was confirmed in the secondary cohort of EA. We defined four EA phenotypic clusters with distinct probabilities of future acute exacerbation of asthma. Our simplified decision-tree algorithm can be easily administered in practice to better understand elderly asthma and to identify an exacerbation-prone subgroup of EA.