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Original Article

Evaluation of symptoms and risks in stable chronic obstructive pulmonary disease patients with radiographic bronchiectasis

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Abstract

Objective: To investigate the presence of previously undiagnosed radiographic bronchiectasis in stable chronic obstructive pulmonary disease (COPD) patients using high resolution computed tomography (HRCT) and to evaluate the effect of radiographic bronchiectasis on the symptoms and risks in stable COPD patients.

Methods: From May 2012 to April 2014, there were 347 patients enrolled in COPD database. Data describing the general conditions, the frequency of acute exacerbations the year before, COPD assessment test, modified medical research council (mMRC) score, spirometric classification, and HRCT were collected. COPD patients were classified into two groups: COPD with bronchiectasis and COPD without bronchiectasis. The clinical characteristics of both groups were compared.

Results: Bronchiectasis was presented in 18.4% ($n = 64$). The proportion of smokers, smoking index, and forced expiratory volume in 1 second predicted value were 62.5%, 27.3 ± 13.2, 48.2 ± 26.4, respectively, in the bronchiectasis group, which were lower than those of the group without bronchiectasis (82.0%, 32.6 ± 17.6, and 57.9 ± 18.8) ($P < 0.05$). Complications, COPD assessment test (CAT) and the rate of CAT ≥ 10 in the bronchiectasis group were 2.8 ± 1.7,13.6 ± 7.4 and 26.6%, respectively, which were higher than those of the group without bronchiectasis (2.3 ± 1.5,11.3 ± 6.0, and 11.7%) ($P < 0.05$). The proportion of type D (high-risk more-symptoms) in the bronchiectasis group was 50.0%; it was significantly higher than that of 35.7% in the group without bronchiectasis ($P < 0.05$).

Conclusions: COPD with bronchiectasis is associated with more complications, symptoms, and risks. More attention should be paid to the treatment of COPD with bronchiectasis to reduce the frequency of exacerbation and improve the health status.

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Keywords: Bronchiectasis; Chronic obstructive pulmonary disease; Combined assessment; High resolution computed tomography; Symptoms and risk

Introduction

In recent years, chronic obstructive pulmonary disease (COPD) is being gradually recognized as a systemic disease.[1,2] With the extensive use of high-resolution computed tomography (HRCT), radiographic bronchiectasis, which could not be identified in the past, is

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being diagnosed.[3] Research has shown that radiographic bronchiectasis can prolong the duration of the episodes of acute exacerbation of COPD[4] and increase the mortality.[5] Therefore, radiographic bronchiectasis was listed as one of the comorbidities of COPD in the Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2014 for the first time.[1] However, the incidence rate (4−50%) of COPD complicated with radiographic bronchiectasis varies considerately in different studies.[3,4,6,7] This indicates that the incidence of radiographic bronchiectasis may be related to the severity level of airflow limitation. However, there are few reports till date on the comprehensive evaluation of symptoms and risks in COPD patients with radiographic bronchiectasis. This study was designed, through a comprehensive evaluation of patients with stable COPD complicated with radiographic bronchiectasis, to investigate the incidence of radiographic bronchiectasis in patients with different subtypes of COPD and its effects on stable COPD patients. Results of this study will also provide valuable information for the better control of COPD progression.

Methods

Study population

A total of 461 patients who attended the COPD outpatient clinic of our hospital from May 2012 to April 2014, with established disease archives, were enrolled in this survey. All recruited patients complied with the COPD diagnostic criteria that is, the ratio of the forced expiratory volume in 1 s to the forced vital capacity (FEV_1/FVC) should be less than 70% following bronchodilator inhalation, and were stable at the time of the test. The exclusion criteria were as follows: (1) concomitant classical bronchiectasis, active tuberculosis, bronchial asthma or pulmonary interstitial fibrosis with definite and typical clinical symptoms; (2) concomitant serious cardiac, cerebral, hepatic or renal insufficiency; (3) inability to read and answer the questionnaire independently.

Measurements

A face-to-face survey was conducted for all enrolled patients between May 2012 and April 2014, in the outpatient clinic of the pulmonary department, Peking University People's Hospital.[8] The patient history and symptoms were evaluated, and physical examination were conducted by medical professionals. The survey recorded data such as demographic characteristics, presence of complications, smoking status, and the number of exacerbations of COPD within the previous 12 months. The COPD assessment test (CAT) and modified medical research council (mMRC) questionnaires were completed by patients after receiving appropriate guidance from a physician.[9,10]

Lung function and bronchodilation test were performed using a fully automatic pulmonary function analyzer (Master Screen-PFT, CareFusion Germany 234 GmbH, Leibnizstrasse 7-97204 HoechbergJaeger®, Germany). For all patients who accepted pulmonary HRCT test, radiographic bronchiectasis analysis was performed by radiologists using HRCT test to determine presence of bronchiectasis.[11] Depending on the morphological characteristics cystic, cylindrical and thick- and thin-walled bronchiectactic areas were identified.[12−15] All patients with COPD were divided into a bronchiectasis group or a "without bronchiectasis" group based on the presence of HRCT-verified bronchiectasis.

Based on the symptoms, lung function tests, and risk of acute exacerbation of chronic obstructive pulmonary disease (AECOPD), patients were classified into four types: low-risk fewer-symptoms (Type A), low-risk more-symptoms (Type B), high-risk fewer-symptoms (Type C), and high-risk more-symptoms (Type D).

Statistical analysis

A database was created using EpiData (version 3.1 freeware from http://www.epidata.dk), and the double-entry method was adopted for quality control. For statistic analysis, SPSS 18.0 (SPSS Inc., Chicago, IL, USA) was used. Continuous variables were represented as mean ± standard deviation (SD). Categorical variables were expressed as numbers (%) and contingency tables and χ^2 tests were used for comparing the numerical data. One-way analysis of variance (ANOVA) was employed for inter-group comparison of the data with the significance level α set at 0.05.

Results

Of the 461 COPD patients identified, 347 patients had undergone HRCT examination. The remaining 114 patients only had the results of chest X-ray alone. Therefore, 347 patients were included in the primary analysis. Comparison of the baseline data from the archives of recruited and non-recruited patients showed no significant differences in terms of age, body mass index, smoking index, FEV_1/FVC % in both groups ($P = 0.485−0.523$). Males accounted for 87.3% of the recruited patients; this was higher than the proportion in the unselected patients ($\chi^2 = 7.98$, $P = 0.005$). The

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