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Characteristics of community-acquired pneumonia in patients with chronic obstructive pulmonary disease

Ricard Pifarre[a,*], Miquel Falguera[b], Carmina Vicente-de-Vera[b], Antonio Nogues[c]

[a]*Hospital Universitari Arnau de Vilanova, Service of Pneumology, Lleida, Spain*
[b]*Hospital Universitari Arnau de Vilanova, Service of Internal Medicine, Lleida, Spain*
[c]*Hospital Universitari Arnau de Vilanova, Service of Microbiology, Lleida, Spain*

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Outcome;
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Summary
Study objectives: Community-acquired pneumonia is a frequent event in the course of chronic obstructive pulmonary disease (COPD). The aim of the present study was to provide information on clinical and microbiological characteristics and outcome of community-acquired pneumonia in these patients, in a comparative study with the non-COPD population.
Design: Prospective study of cases.
Setting: A university hospital in Lleida, Spain.
Patients: During a 6 year-period, we prospectively studied the clinical and radiological manifestations, microbiological data and outcome of all patients with community-acquired pneumonia. A comparative analysis of characteristics of pneumonia between 132 patients with a definitive diagnosis of COPD and 575 patients who did not have this underlying disease was performed.
Measurements and results: COPD was associated with an older and predominantly male population. These patients frequently had concomitant comorbidities such as diabetes mellitus or chronic heart failure. Clinical presentation was more severe, manifested by septic shock, tachypnea, lower values of pH, pO_2 and oxygen saturation, and greater values of pCO_2. Purulent expectoration was also more frequent in this subset of patients. Admission was usually required for patients with COPD, and length of hospitalization was significantly increased; however, difference in the mortality rate was not observed. Although the spectrum of responsible microorganisms was very similar, the incidence of *Pseudomonas aeruginosa* and other Gram-negative bacilli was increased in COPD, particularly among patients with advanced situation and/or oral corticosteroid treatment.
Conclusions: Community-acquired pneumonia in patients with COPD was associated with epidemiological and clinical particularities mainly related to the underlying disease but

*Corresponding author. Tel.: +34 973248100; fax: +34 973705273.
E-mail addresses: rpifarre@arnau.scs.es (R. Pifarre), mfalguera@comll.cat (M. Falguera), pporta@hispavista.com (C. Vicente-de-Vera), anogues@arnau.scs.es (A. Nogues).

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showed only minor differences in outcome parameters. Gram-negative bacilli and *P. aeruginosa* are potential pathogens that need to be considered.

Introduction

Chronic obstructive pulmonary disease (COPD) is a widespread pathology that causes a high level of morbidity and mortality.[1] Community-acquired pneumonia constitutes one of the most severe complications; epidemiological studies show that COPD is the underlying disease most frequently associated with pneumonia.[2] Patients with COPD present anatomopathological changes to the bronchial mucosa that facilitate colonization of the lung by potentially pathological micro organisms, which may lead to episodes of pneumonia and a unique etiological and outcome spectrum of conditions.[3]

In recent years several studies have been conducted with patients affected by community-acquired pneumonia as a result of a number of underlying illnesses, particularly immunosuppressive diseases (neutropenia, HIV infection)[4,5] or, less frequently, patients with diabetes mellitus.[6] Nevertheless, the information available regarding patients with COPD as underlying pathology is limited because of the absence of a control group or the reduced sample. It would be helpful to have broader studies that include exhaustive etiological, clinical and outcome information, as well as having a control group for comparing this data in order to complete or corroborate the findings of previous studies.

The present manuscript focuses on these points, attempting to more reliably understand the etiological spectrum of the disease, as well as aspects related to the clinical presentation and outcome of community-acquired pneumonia in patients with COPD, simultaneously analyzing the possible differences with respect to patients without this underlying condition.

Methods

Setting and study design

For a 6-year period (January 1998–December 2003), all adult patients with community-acquired pneumonia diagnosed at the Emergency Room of the Arnau de Vilanova University Hospital in Lleida (Catalonia, Spain) were evaluated for inclusion in a prospective study of epidemiological, clinical, microbiological, radiological and outcome parameters. This study was evaluated and approved by the Scientific and Ethics Committees of the institution.

Clinical evaluation of patients

On enrollment, all patients underwent a complete physical examination, had their clinical history recorded, and a chest radiography, as well as basic chemistry and hematology tests. The presence of comorbid conditions was determined by patient report and a review of medical records. The validated Pneumonia Severity Index (PSI) prediction rule was used to determine the severity of illness at presentation, and patients were stratified into prognostic groups. Patient complications and mortality during follow-up were also recorded for a 30-day period after clinical resolution of the pneumonia.

Definitions

Community-acquired pneumonia was defined as the presence of acute illness with features of lower respiratory tract infection (two or more of the following signs and symptoms: fever, new or increasing cough or sputum production, dyspnea, chest pain or new focal signs on chest examination) and the presence of a consolidation in the chest radiography consistent with acute infection. In absence of radiological findings, the clinical picture was defined as COPD exacerbation. Patients with tuberculosis or opportunistic infections were excluded from the study.

COPD was defined as a preventable and treatable disease state characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and is associated with an abnormal inflammatory response of the lungs to noxious particles or gases, primarily caused by cigarette smoking that affects particularly the lungs but it also produces significant systemic consequences. In addition, a spirometric test showing a post-bronchodilatador $FEV_1/FVC \leqslant 0.7$ was required.[7]

Microbiological studies

Microbiological evaluation included testing of the following: two blood samples for conventional aerobic and anaerobic cultures; Gram stain and a culture of sputum, when available; urine testing for *Streptococcus pneumoniae* or *Legionella pneumophila* antigens with the rapid Binax Now test (Leti Laboratories, Barcelona, Spain); Gram stain and culture of pleural fluid, if a sufficient amount of pleural effusion was radiologically detected; a sample of blood and pleural fluid (if available) for *S. pneumoniae* DNA detection by the polymerase chain reaction (PCR) method; and two serum samples (at entry and between 4 and 6 weeks later) for serological studies to detect antibodies against *Mycoplasma pneumoniae* and *L. pneumophila* using the immunofluorescence test, *Coxiella burnetii* and viruses (adenovirus, influenza A, influenza B and parainfluenza) using the complement fixation method, and *Chlamydia psittaci* and *Chlamydia pneumoniae* using the microimmunofluorescence test. The methodology for PCR testing in whole blood or pleural fluid has been described in previous papers.[8,9]

According to the test results, etiologic diagnosis was considered definitive when either a respiratory pathogen