J Infect Chemother 20 (2014) 471–476

Contents lists available at ScienceDirect

Journal of Infection and Chemotherapy

journal homepage: http://www.elsevier.com/locate/jic

Original article

Clinical characteristics of severe community-acquired pneumonia among younger patients: An analysis of 18 years at a community hospital

Tadashi Ishida*, Hiromasa Tachibana, Akihiro Ito, Maki Tanaka, Fumiaki Tokioka, Kenjiro Furuta, Akihiro Nishiyama, Satoshi Ikeda, Takashi Niwa, Hiroshige Yoshioka, Machiko Arita, Toru Hashimoto

Dept. of Respiratory Medicine, Kurashiki Central Hospital, Kurashiki, Japan

ARTICLE INFO

Article history:
Received 4 February 2014
Received in revised form
21 March 2014
Accepted 15 April 2014
Available online 18 June 2014

Keywords:
Severe community-acquired pneumonia
Younger patients
Severity criteria
Mortality

ABSTRACT

Unlike elderly patients with community-acquired pneumonia whose outcomes are markedly affected by their background characteristics, it appears that the severity of the infection itself contributes to outcomes in younger patients with community-acquired pneumonia. In order to identify clinical characteristics of severe community-acquired pneumonia in younger patients under 60 years old, among such cases prospectively collected at our hospital over a period of 18 years, those meeting the criteria for severe community-acquired pneumonia, as defined in the Infectious Diseases Society of America/American Thoracic Society Guidelines for community-acquired pneumonia, were retrospectively examined and compared to elderly patients with severe community-acquired pneumonia. Younger patients with severe pneumonia accounted for 12.9% of younger hospitalized patients. Although the incidence of severe pneumonia in younger patients was lower than that in elderly patients, its severity may be underestimated by severity assessment based on the conventional guidelines. Thus, attention is required. While *Streptococcus pneumoniae* and *Legionella* species were important causative pathogens, atypical pathogens and viruses were also frequently detected. There were only 11 deaths over a period of 18 years. Based on multivariate analysis, the risk factors for aggravation of community-acquired pneumonia among younger patients were age 50 years or older, diabetes mellitus, chronic liver disease, and *Legionella* pneumonia. Although the mortality rate from community-acquired pneumonia is extremely low in previously healthy younger patients, outcomes might be poor for patients with underlying diseases and those with rapid progression. Multimodal treatments including respiratory management may be appropriate.

1. Introduction

In 2012, approximately 123,000 people died of pneumonia in Japan. The mortality rate per 100,000 people was 98.4. Pneumonia is ranked third as the cause of death, following malignant neoplasms and heart disease [1]. In Japan, 98% or more of pneumonia deaths are in the elderly, those aged 60 years or older, and the number of younger patients (less than 60 years of age) who die of pneumonia is extremely small [1]. Unlike elderly patients whose pneumonia outcomes are markedly affected by underlying diseases and general host conditions, it appears that the severity of pneumonia itself impacts mortality in younger patients. Although measures aimed at elderly patients are necessary for reducing pneumonia mortality overall, it is also important to improve survival in younger patients with severe pneumonia.

In order to elucidate the clinical characteristics of severe community-acquired pneumonia (CAP) in younger patients, we retrospectively examined the medical records of patients admitted for CAP. They were prospectively studied at our hospital over the past 18 years. We identified the clinical characteristics of severe

* Corresponding author. Dept. of Respiratory Medicine, Kurashiki Central Hospital, 1-1-1, Miwa, Kurashiki, Okayama 710-8602, Japan. Tel.: +81 86 422 0210; fax: +81 86 422 6696.
E-mail address: ishidat@kchnet.or.jp (T. Ishida).

http://dx.doi.org/10.1016/j.jiac.2014.04.005
1341-321X/

CAP in younger patients (less than 60 years of age), and compared them to elderly patients with severe CAP. Risk factors for disease aggravation in younger patients were also analyzed.

2. Patients and methods

2.1. Study population and data collection

Kurashiki Central Hospital is a municipal base hospital with 1152 beds, and we have been prospectively collecting data on patients with CAP admitted to the Department of Respiratory Medicine since 1994. We conducted a retrospective analysis of this prospectively collected database of hospitalized patients over 15 years old, who had CAP between July 1994 and July 2012. Pneumonia was diagnosed as a disease presenting with new infiltrative shadows on chest X-ray, and symptoms of acute respiratory infection, such as cough, fever, purulent sputum, dyspnea and chest pain. Patients with hospital-acquired pneumonia (HAP) or healthcare-associated pneumonia (HCAP) [2] were excluded from this analysis.

Data included patient characteristics (i.e. age, sex, comorbid diseases, and smoking habits), previously used antimicrobials, vital signs, laboratory data, percutaneous oxygen saturation or arterial blood gases, results of microbiological examinations, affected lobes on chest roentgenograms, antimicrobials or other agents used, use of artificial respiration, length of hospital stays and clinical outcomes. These outcome measures were evaluated by 30-day survival or discharge from the hospital within 30 days.

The study was approved by the Kurashiki Central Hospital ethics committee as a part of clinical studies for pneumonia (approval number 363).

2.2. Microbiological examination

Blood cultures were performed upon admission of all patients. If available, a Gram staining and a quantitative culture of sputum were performed. Sputum data were only evaluated when the Gram staining revealed numerous leucocytes (>25 in a 100× microscopic field) and few epithelial cells. An organism exhibiting heavy growth ($\geq 10^7$ colony forming unit (CFU)/mL) of a predominant bacterium on sputum culture was considered to be a presumptive pathogen. Moderate growth (10^5 or 10^6 CFU/mL) on the sputum culture was also considered as evidence of a presumptive pathogen if the Gram staining revealed a bacterium compatible with the culture results.

Streptococcus pneumoniae and *Legionella pneumophila* serogroup 1 were also detected using a rapid immunochromatographic assay, Binax NOW® (Binax Inc., Portland, ME, U.S.A.).

Mycoplasma pneumoniae was detected by culturing sputum samples or pharyngeal swabs in PPLO (pleuropneumonia-like organism) medium and/or by the PA method for measuring serum antibodies (a single increase ≥320 or a four−fold increase in the paired sera). *Chlamydophila pneumoniae* was detected by antibody measurement by ELISA, singly or in combination (a single increase up to ≥3.0 cut-off index or a ≥1.3 cut-off index increase in the paired sera). *Chlamydophila psittaci* and viruses were also measured in paired serum samples and a four-fold increase in the antibody titer level between paired sera was considered presumptive.

When plural pathogens satisfied the above criteria in one patient, it was defined as polymicrobial.

2.3. Definition of severe pneumonia

In this study, patients who met the criteria for severe pneumonia (Table 1), as described in the Infectious Diseases Society of America (IDSA)/American Thoracic Society (ATS) Guidelines for CAP (2007) [3], were defined as having severe pneumonia. Simultaneously, these patients were classified according to disease severity based on the A-DROP system of the Japanese Respiratory Society guidelines for the management of CAP [4] and the Pneumonia Severity Index (PSI) [5]. Clinical findings were compared between the severe pneumonia patients less than 60 years of age (younger group) and those aged 60 years or older (elderly group). Younger patients were defined as less than 60 years old because JRS guidelines include this criterion to differentiate between atypical pneumonia and bacterial pneumonia considering the difference in age. Risk factors for disease aggravation in younger patients were also analyzed.

Table 1
Criteria for severe community-acquired pneumonia (IDSA/ATS CAP Guidelines 2007).

- 3 or more of minor criteria
  - Respiratory rate ≧30 breaths/min
  - PaO_2/FiO_2 ratio ≦250
  - Multilobar infiltrates
  - Confusion/disorientation
  - Uremia (BUN level ≧20 mg/dL)
  - Leukopeniac (WBC count <4000 cells/mm^3)
  - Thrombocytopenia (platelet count <100,000 cells/mm^3)
  - Hypothermia (core temperature <36 °C)
  - Hypotension requiring aggressive fluid resuscitation
- 1 or more of major criteria
  - Invasive mechanical ventilation
  - Septic shock with the need for vasopressors

2.4. Statistical analysis

Data was analyzed using SPSS® software version 18.0 (SPSS Inc., Chicago, IL, U.S.A.). Univariate analysis was carried out using the Fisher exact test for categorical data. A multivariate analysis with the logistic regression model through backward elimination method was performed using variables with a significant *P* value for univariate analysis to determine risk factors for severe CAP. A *P* value <0.05 was considered statistically significant.

3. Results

A total of 2347 patients with CAP had been admitted to our hospital and were prospectively studied during this period. They included 550 patients aged less than 60 years (23.4%) and 1797 aged 60 years or older (76.6%). The number of patients who met the criteria for severe pneumonia described in the IDSA/ATS guidelines

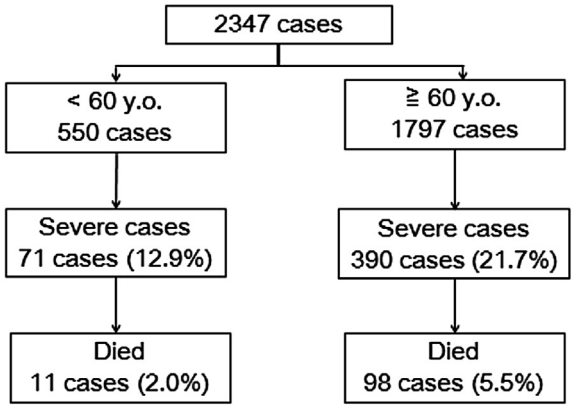

Fig. 1. Patients with community-acquired pneumonia admitted to Kurashiki Central Hospital over 18 years.