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ORIGINAL ARTICLE

Outcome of community-acquired pneumonia with cardiac complications

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KEYWORDS

Pneumonia;
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Abstract *Background:* Although pneumonia is a leading cause of death, little consideration has been given to understanding the contributors to this mortality. Previous studies have suggested an increased mortality in pneumonia patients who develop cardiac complications. The aim of this study was to examine the risk factors and outcome of cardiac complications in admitted patients with community-acquired pneumonia.

Patients and methods: This study included 130 patients hospitalized with a primary diagnosis of community-acquired pneumonia. All patients were subjected to complete medical history, general and local chest examination, Laboratory investigations (complete blood count, renal and hepatic function tests, serum electrolytes, blood sugar, arterial blood gas analysis, CRP, procalcitonin, BNP, cardiac enzymes, blood and sputum Gram stain and culture, sputum PCR for *Mycoplasma pneumoniae*, *Legionella pneumophila*, *Coxiella burnetii*, and *Chlamydophila* species, urine antigen testing for *S. pneumoniae* and *L. pneumophila*, pharyngeal swabs for viral PCR.), radiological investigations, electrocardiographic studies (ECG) and echocardiography.

Results: Among the studied 130 patients, 32 patients (24.6%) had cardiac complications [new or worsening heart failure in16 patients (12.3%), arrhythmias in 12 patients (9.2%), and acute myocardial infarction in 4 patients (3.1%)]. In comparing patients who developed cardiac complications with those who did not they had a significantly higher age (mean ± SD 69 ± 17.3 versus 49 ± 19.1, $p < 0.05$), included a significantly higher percentage of patients with preexisting cardiovascular diseases (40.6% versus 5.1%, $p < 0.05$), had a significantly higher pneumonia severity index (PSI) (mean ± SD 130 ± 27 versus 73 ± 29, $p < 0.05$), a significantly longer hospital stay (mean ± SD 22 ± 7.1 versus 9 ± 4.3, $P < 0.05$) and a significantly higher mortality (21.8% versus 6.1%, $P < 0.05$).

Conclusions: Cardiac complications are common in the admitted patients with pneumonia and they are associated with increased pneumonia severity and increased cardiovascular risk, these

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complications adds to the risk of mortality, so optimal management of these events may reduce the burden of death associated with this infection.

Introduction

Pneumonia is widely recognized as a major cause of morbidity and mortality. Clinically, pneumonia exhibits an extreme variety in the severity of presentation, from almost asymptomatic disease on one side to a fulminant event on the other [1].

Clinical risk scores have been developed for adult patients with pneumonia and are widely used to identify high risk patients in need of intensive treatment and careful monitoring, and low risk patients who may be suitable for out-patient treatment. These scores use clinical indicators from multiple organ systems, acknowledging the importance of systemic illness severity, advanced age, and reduced physiological reserve in determining mortality from pneumonia. For example, only four of the 20 measures in the pneumonia severity index (PSI) and one of five components of the widely used CURB 65 score (Confusion, Urea, and Respiratory rate, Blood pressure, and age $\geqslant$65 years) are direct measures of respiratory function [2]. Mortensen et al. [3] reported that about half of deaths in patients with CAP was attributable to worsening of a pre-existing condition.

Recent studies indicate that cardiac complications are common in patients with community-acquired pneumonia [4–7]. However, the frequency of these complications in unselected CAP patients, the contribution of specific cardiac events to this burden, the timing of these complications in the course of CAP, the factors associated with their development, and their association with the short-term mortality of this infection remain unclear.

Acute bacterial pneumonia stresses the heart by increasing myocardial oxygen demand at a time when oxygenation is compromised by a ventilation–perfusion mismatch. Pneumonia also raises circulating levels of inflammatory cytokines, which promote thrombogenesis and suppress ventricular function. Taken together, these pathophysiologic events might be expected to lead to major, acute cardiac events, such as myocardial infarction (MI), arrhythmia, and/or congestive heart failure (CHF) [8–10].

The aim of this study was to examine the risk factors and outcome of cardiac complications in admitted patients with community-acquired pneumonia as this might help to assess the risk of death and institute the appropriate level of care.

Patients and methods

This clinical study was carried out on 130 patients (68 males and 62 females with a mean age of 59 ± 19.3) hospitalized with a primary diagnosis of community-acquired Pneumonia (CAP) in the period between July 2012 and September 2014 after taking informed consent. Patients with presence of an alternative diagnosis that likely explained the pulmonary symptoms and X-ray infiltrate (e.g., lung carcinoma, pulmonary edema, or pulmonary embolus) were excluded.

All patients were subjected to:

- Complete medical history.
- General and local chest examination.
- Laboratory investigations: complete blood count, renal and hepatic function tests, serum electrolytes, blood sugar, arterial blood gas analysis, CRP, procalcitonin (Kryptor PCT, Brahms, Hennigsdorf, Germany), brain natriuretic peptide (NT-BNP) (Roche Diagnostics Corp., Indianapolis, IN, USA) and serum troponin I (cTnI) concentration using a Siemens Advia Centaur TnI-Ultra Assay (serum cTnI concentration was considered raised if it was $\geqslant$0.04 μg L).
- Microbial etiology: At least two sets of separate blood and sputum samples of each patient were Gram stained and cultured. Moreover, sputum samples were analyzed with TaqMan real-time polymerase chain reactions (PCRs) in order to detect DNA of *Mycoplasma pneumoniae*, *Legionella pneumophila*, *Coxiella burnetii*, and *Chlamydophila* species. Antigen testing of *S. pneumoniae* and *L. pneumophila* was performed in urine samples. Furthermore, pharyngeal swabs were taken for viral culture and viral PCR [11].
- Radiological investigations (plain x ray and computed tomography on the chest).
- Electrocardiographic studies (ECG).
- Echocardiography.

Definitions

Pneumonia was defined as the presence of a new pulmonary infiltrate on a chest radiograph at the time of hospitalization associated with one or more of the following: (1) new or increased cough with/without sputum production; (2) fever ($\geqslant$ 37.8 °C) or hypothermia ($\leqslant$ 35.6 °C); or (3) abnormal white blood cell count (either leukocytosis or leukopenia), or C-reactive protein values above the local upper limit [12].

Severity of pneumonia: on admission to the hospital, patients were assessed using the Pneumonia Severity Index (PSI), a validated prediction rule for 30-day mortality in patients with CAP [2].

Acute myocardial infarction (AMI) The diagnosis of AMI According to the WHO criteria as revised in 2000 [13], a cardiac troponin rise accompanied by either typical symptoms or ischemic ECG changes (ST-segment elevation 0.1 mV or greater in 2 or more contiguous leads, ST-segment depression, T-wave abnormality, and development of pathological Q waves).

New or worsening heart failure, i.e., the presence of clinical signs of new or worsening pulmonary edema or acute congestive heart failure detected by the managing physician.

New arrhythmias ECG monitor, or Holter monitor of newly recognized atrial fibrillation, atrial flutter,