Original Article

Comparative study of elderly inpatients clinically diagnosed with community-acquired pneumonia, with or without radiological confirmation*

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Abstract

Objectives: To compare clinical and radiological aspects, as well as aspects regarding the course of the disease, of elderly inpatients clinically diagnosed with community-acquired pneumonia, with or without radiological confirmation. **Methods:** A total of 141 patients over the age of 60 were retrospectively studied. **Results:** Radiological findings corroborated the clinical diagnosis in 45 patients, whereas, in 96 patients, radiology did not correlate with the clinical suspicion. The signs, symptoms, treatment, and outcomes of these two groups were compared. The findings of the study suggest that there were no significant differences between the groups according to the criteria analyzed. **Conclusion:** The prevalence of chest X-rays compatible with pneumonia in patients suspected of the disease was slightly higher than 30%. Having low specificity in the elderly, the clinical diagnosis of community-acquired pneumonia should be used with caution. In view of the small number of patients studied, further studies on this topic are needed in order to confirm the findings.

Keywords: Pneumonia; Aged; Diagnosis; Radiology; Hospitalization.

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Submitted: 24 April 2006. Accepted, after review: 6 October 2006.

Introduction

Population aging is a universal phenomenon. Worldwide, the growth of the elderly population is proportionally greater than that of any other age group. In Brazil, the percentage of individuals aged 60 or older was 9% in 2000, whereas it was only 4% in 1940. The Brazilian population aged 60 or over currently comprises more than 15 million inhabitants. Despite being a small contingent, the segment of the population aged 80 or over is the one that has grown the most (from 166,000 in 1940 to 1,900,000 in 2000), accounting for 12.6% of the elderly population and 1.1% of the general population.[1]

There has been an increase in life expectancy in Brazil due to a decrease in infant mortality, improved health conditions, use of better technology, and greater access to health care centers, as well as better monitoring of the treatment of infectious and cardiovascular diseases. In 1980, life expectancy at birth was 57.2 years for males and 64.3 years for females, compared with 1998, when it was 63.9 years for males and 71.4 for females.[1]

In the United States, community-acquired pneumonia (CAP) is the sixth leading cause of death in general and the leading cause of death from infectious diseases in the elderly.[2,3] In the United States, it is estimated that 20% of patients with CAP require hospitalization. The mortality rate is 1% for outpatients and 25% for inpatients.[2,3]

The clinical criteria used in the diagnosis of CAP provide a sensitivity of less than 50% in adults and an even lower sensitivity in the elderly, who typically present manifestations that are not very significant (atypical).[4] Fever, for example, which is present in up to 80% of young adults with CAP, is less common in the elderly. In addition, it is known that the elderly generally have a worse prognosis.[4]

According to data obtained from the Information Technology Department of the Unified Health Care System,[5] the number of hospitalizations for pneumonia in the state of Minas Gerais between January 1998 and August 2002 was 93,427, the expenditure being estimated at R$ 22,172,542.38 Brazilian reals, and the mean hospital stay being 6 days. Of those 93,427 patients, 8302 died, translating to a mortality rate of 8.89%.

In the United States, for which there are more accurate statistics, it is estimated that the cost of CAP is nearly US$ 10,000,000,000 per year, 90% of which is spent on the treatment of patients who require hospitalization.[6] Adequate knowledge of the clinical presentation of CAP in the elderly, and of its clinical and radiological correlation, is fundamental to reducing mortality and treatment costs.

The elderly are especially susceptible to pneumonia. In 1902, Sir William Osler stated that pneumonia in the elderly can be silent, latent, without fever, and with mild cough and expectoration, that clinical examination is ill-defined and mutable, and that the entire group of symptoms is disproportionate to the severity and the systemic repercussions.[7]

With advancing age, the risk of bacterial colonization, and consequent aspiration, increases due to certain factors that are more prevalent in the elderly than in the young. Such factors include periodontal disease, malnutrition, changes in mucociliary activity in the respiratory tract (especially among smokers or former smokers), cognitive deficit, institutionalization, hospitalization, polypharmacy, and Parkinson's disease. Anatomical changes, immunological alterations, lack of autonomy in activities of daily living, immobility, and comorbidities can delay diagnosis and, consequently, worsen the prognosis.

The objective of the present study was to compare the differences among elderly inpatients clinically diagnosed with CAP, with and without radiological confirmation, in terms of clinical characteristics, auscultatory findings, associated diseases, and disease outcome (death or improvement).

Methods

This was a retrospective study based on the analysis of medical charts and chest X-rays of elderly patients who sought treatment in the emergency room of, and were subsequently hospitalized in, the Júlia Kubitschek Hospital, a referral hospital in the metropolitan area of the city of Belo Horizonte, Brazil, between January of 1998 and August of 2002.

These patients were clinically diagnosed with pneumonia, nonspecific bacterial pneumonia, or nonspecific bronchopneumonia, these diagnoses being registered on the hospitalization authorization form. Clinical examination upon admission and the decision regarding hospitalization were made by the team of attending physicians.

Patients aged 60 or older who sought emergency treatment at the hospital and were hospitalized with a diagnosis of pneumonia registered on the hospitalization authorization form were included in the study. Patients with a history of pulmonary tuberculosis or neoplasms were also included if those diseases had been cured. Some of the patients sought treatment during the first few days of the disease, and the remainder sought treatment during the first few weeks.

For the purpose of the study, the imaging diagnosis was established through the evaluation of chest X-rays, this evaluation being performed by two independent physician researchers. The radiological criteria considered consistent with pneumonia were as follows: alveolar opacification in one or more lobes, nodular infiltrates suggestive of bronchopneumonia, diffuse interstitial infiltrates, and pleural effusion. The chest X-rays performed within the first 48 h after admission were evaluated and were considered a diagnostic criterion.

Patients under 60 years of age, patients with active neoplasms (treated or untreated), patients with pulmonary or active pleural tuberculosis (treated or untreated), and patients taking immunosuppressants, as well as patients infected with the human immunodeficiency virus, were excluded. Pharmacological therapy was determined upon admission.

A total of 141 patients were selected and were divided into two groups: Group 1, comprising patients whose clinical criteria and radiological findings were suggestive of pneumonia; and Group 2, comprising patients in whom the radiological diagnosis did not corroborate the clinical hypothesis.

Results

Chest X-ray findings were consistent with clinical suspicion of pneumonia in 45 patients (31.9%, Group 1). In Group 1, the mean age was 76 ± 8.1 years, and the mean hospital stay was 18.5 ± 12.5 years. Of the 45 patients in this group, 23 (51%) were female, and 22 (49%) were male (Table 1).

Group 2 comprised the 96 patients (68.1%) in which the diagnosis of pneumonia was not confirmed radiologically. In this group, the mean age was 75.6 ± 8.7 years, the mean hospital stay was 21 ± 19.9 days, 50 (52.1%) of the patients were female, and 46 (47.9%) of the patients were male.

Based on this division of the groups, we observed that the prevalence of chest X-ray findings consistent with pneumonia was slightly over 30% among the patients with clinical suspicion of having the disease.

For the study sample as a whole, the mean hospital stay was 18.6 days. Among the patients whose clinical profile improved, the mean hospital stay was 20 days, compared with 14 days among those who died.

There was no predominance of either group in terms of clinical signs/symptoms, auscultatory findings, or prevalence of comorbidities. Although the odds ratios showed stronger correlations for certain variables (such as weight loss and mental confusion), the differences were not statistically significant (Table 2 and Figure 1).

The most commonly used antibiotics were third-generation cephalosporins (in 28 patients) and amoxicillin/clavulanate (in 17 patients), which together accounted for approximately 65% of the antimicrobial agents used. The antibiotics were administered intravenously in 37.8% of the patients, intravenously and orally in 35.6%, and orally in the remaining 26.7%. One patient did not receive antibiotics. It is believed that the hypothesis of bacterial pneumonia was not considered in this case, although this is not explicitly stated on the medical chart.

Of the variables studied, only the need for mechanical ventilation correlated significantly with mortality, regardless of the study group (Table 3).

Table 1 - Profile of the groups studied.

	Mean ± standard deviation or number (%)	
	Group 1 (n = 45)	Group 2 (n = 96)
Mean age (years)	76 ± 8.1	75.6 ± 8.7
Males/Females	22 (49)/23 (51)	46 (47.9)/50 (52.1)
Mean hospital stay (days)	18.5 ± 12.5	21 ± 19.9

Table 2 - Results.

	n (%)		OR	95% CI	p
	Group 1	Group 2			
Chest pain	20 (44.4)	29 (30.2)	1.85	0.83-4.10	0.097
Cough	36 (80.0)	74 (77.0)	1.19	0.46-3.12	0.696
Dyspnea	36 (80.0)	73 (76.0)	1.26	0.49-3.29	0.600
Prostration	27 (60.0)	54 (56.2)	1.17	0.53-2.55	0.674
Loss of appetite	24 (53.3)	39 (40.6)	1.67	0.77-3.63	0.157
Mental confusion	7 (15.5)	27 (28.1)	0.47	0.17-1.27	0.103
Weight loss	14 (31.1)	17 (17.7)	2.10	0.86-5.15	0.073
Hemoptysis	3 (6.60)	8 (8.30)	0.79	0.16-3.50	0.730
Decreased BS	28 (63.6)	61 (63.5)	1.00	0.45-2.25	0.991
Crackles	26 (59.0)	56 (58.3)	1.03	0.47-2.27	0.932
Ronchi	11 (25.0)	25 (26.0)	0.95	0.38-2.31	0.895
Wheezing	10 (22.7)	17 (17.7)	1.37	0.52-3.57	0.484
SAH	23 (51.1)	57 (59.3)	0.72	0.33-1.55	0.355
DM	7 (15.5)	17 (17.7)	0.86	0.29-2.44	0.751
COPD	13 (28.8)	33 (34.3)	0.78	0.33-1.79	0.517
PTBs	3 (6.60)	11 (11.4)	0.55	0.12-2.30	0.375
Death	9 (20.0)	24 (25.0)	0.75	0.29-1.91	0.513
Need for MV	6 (13.3)	7 (7.20)	1.96	0.54-7.04	0.247

BS: breath sounds; SAH: systemic arterial hypertension; DM: diabetes mellitus; COPD: chronic obstructive pulmonary disease; PTBs: pulmonary tuberculosis sequelae; MV: mechanical ventilation; OR: *odds ratio*; 95% CI: 95% confidence interval.

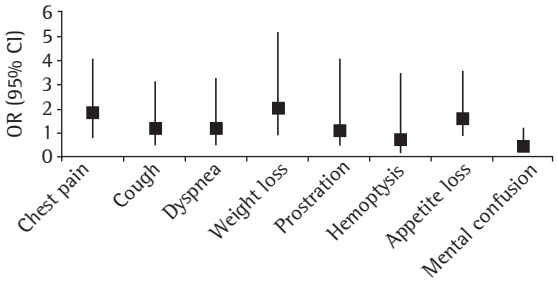

Figure 1 - Signs and symptoms.

Discussion

In the elderly, CAP frequently manifests atypically, with alterations such as mental confusion, appetite loss, and prostration. These findings are corroborated by various authors.[7-11] The symptoms cough and chest pain were absent in some cases (20 and 55.6%, respectively). These findings should call the attention of physicians to the symptoms of lung infection in the elderly.

There were no significant differences between the two groups in terms of clinical signs, auscultatory findings, outcomes, or of the need for mechanical ventilation. This might be related to the small sample size, since, for some variables, such as the need for mechanical ventilation, there was clear indication of a difference between the groups, albeit without statistical significance.

The gold standard for the diagnosis of pneumonia is the identification of the infectious agent in a sterile medium. However, the etiologic agent is identified in less than 50% of cases, and this figure is probably lower in Brazil. On the medical charts analyzed, there were no references to the performance of procedures for microbiological identification, be it in blood culture, bronchial lavage fluid, sputum culture, or pleural fluid.

In the present study, the combination of clinical and radiological evidence suggestive of pneumonia was considered a diagnostic criterion. In a recent review,[4] it was demonstrated that even a combi-

Table 3 - Association between mechanical ventilation and mortality.

Mechanical ventilation	Improvement	Death	Total
With	3 (50%)	3 (50%)	6 (13.3%)
Without	33 (84.6%)	6 (15.4%)	39 (86.7%)
Total	36	9	45
OR 5.50	95% CI: 0.66-48.71		p < 0.05

OR: *odds ratio*; 95% CI: 95% confidence interval.

nation of signs and symptoms in a patient with pneumonia does not have a sensitivity greater than 50%. A respiratory rate higher than 24 breaths per minute seems to be the most sensitive sign in the elderly. Fever is a common, although rather nonspecific, finding in up to 80% of the cases.[8] Chest pain has a sensitivity of only approximately 30%. In addition, it is known that the absence of changes in vital signs has a high negative predictive value.[4,12] The negative predictive value of chest X-ray findings seems to be negligible.[13] However, in patients with a clinical profile suggestive of pneumonia, abnormal radiological findings have a high positive predictive value, allowing this combination to be adopted as an 'acceptable standard' for the diagnosis of pneumonia.

There was great similarity between the two groups in terms of clinical aspects, pulmonary auscultation, comorbidities, and outcomes. However, although all the patients had been treated with antibiotics, only approximately one-third presented radiologically confirmed pneumonia. It is suggested that the criteria for the diagnosis and treatment of pneumonia be applied more rigorously.

We chose to study the radiological examinations performed within the first 48 h after admission, even considering that some patients with CAP (dehydrated patients, for example) might not present consolidations on chest X-rays in the initial stages of the disease. In addition, the X-rays taken over the course of the disease were not considered since X-ray images can be attenuated or normalized with the introduction of the drug therapy, or can even reveal a profile consistent with nosocomial pneumonia.

It must be taken into consideration that, among the patients in whom there was no radiological confirmation of pneumonia and who presented improvement, there were many who received specific treatment for other comorbidities, such as heart failure and obstructive pulmonary disease (36 and 45 patients, respectively).

The fact that the two groups presented similarities in terms of the clinical criteria indicates the need for the radiological evaluation to be more accurate (preferably being performed by two different physicians at two different time points) in order to avoid misdiagnosis.

The elderly inpatients with CAP, with or without radiological confirmation, did not seem to differ significantly in terms of clinical manifestations (signs and symptoms), pulmonary auscultation findings, comorbidities, or some outcomes.

The present study was retrospective, based on the analysis of medical charts, and the size of the sample analyzed was insufficient for the statistical validation of the results. Therefore, further studies on this subject are warranted.

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