PROFILE OF PNEUMONIA IN COPD

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ABSTRACT

BACKGROUND

Community-acquired pneumonia constitutes one of the most severe complications with epidemiological studies showing COPD as the most frequent co-morbidity in patients hospitalized with pneumonia. Although COPD is a clear risk factor for CAP, it has not been shown as a risk factor for mortality. A strong association between chronic obstructive pulmonary disease (COPD) and severe community-acquired pneumonia (SCAP), mainly caused by Streptococcus pneumonia or Haemophilus influenza, has been established.

OBJECTIVES

To study the clinical profile, the radiological presentation, bacteriological profile, prognostic factors, complications and outcomes of pneumonia in COPD patients.

METHODOLOGY

It is prospective clinical study of 50 cases of CAP in known COPD attending government chest hospital AUG 2014- JUL 2015.

KEYWORDS

Community Acquired Pneumonia, Chronic Obstructive Pulmonary Disease, Curb65 Score, Decaf Score.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a common respiratory disease. COPD defined as a common preventable and treatable disease, is characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases.1 Over the prolonged, chronic course of the disease, episodes of acute exacerbation often occur. Exacerbations and co-morbidities contribute to the overall severity in individual patients which can cause significant pulmonary and extra pulmonary effects.

Community acquired pneumonia (CAP) is an infectious disease with a broad spectrum of severity. Among CAP patients with the highest severity of disease who require hospitalization, COPD is the most common co-morbidity.2 Broadly, there are three approaches to define the diagnosis in patients with AECOPD and complicating pneumonia:

1. AECOPD and CAP are separate entities and hence the presence of consolidation precludes the diagnosis of AECOPD;
2. The final diagnosis is AECOPD if the primary reason for admission is AECOPD rather than CAP and vice versa; and
3. The presence of consolidation is marker of a severe exacerbation of COPD, and if they coexist the features, mortality predictors and complications in association with community acquired pneumonia.

AIMS AND OBJECTIVES

- To study the clinical profile of pneumonia in COPD.
- To study the radiological presentation and bacteriological profile of community acquired pneumonia in COPD.
- To study the prognostic factors, (i.e mortality predictors) complications and outcomes of pneumonia in COPD patients.

PATIENTS AND METHODS

Among the CAP patients in COPD who were admitted in the Government Hospital for chest and communicable diseases, Visakhapatnam, from August 2014 to July 2015, 50 cases were selected for the study. The inclusion and exclusion criteria used for this study were.

Inclusion Criteria

- Patients presenting with at least two clinical symptoms suggestive of lower respiratory tract infection in individuals like acute onset of fever with chills and rigors, cough with or without expectoration, pleuritic chest pain and breathlessness.
Shortness of breath was reported in all the 50 subjects of this study among whom 4% had grade I and II, 30% had grade III, 24% had grade IV, 22% had grade Va and 20% had grade Vb dyspnoea.

**Risk Factors Associated with COPD**

Smoking was the most common risk factor associated with COPD accounting for 80% of the cases among whom males were 36% (72%) and females were 8% (16%). In 3 male patients who did not smoke, history suggested that environmental pollution could be the cause of COPD. 3 females (6%) who were non-smokers had history of exposure to biomass fuel. 29 (58%) patients were current smokers and 15 (30%) were former smokers. 16 patients (32%) had ≤20 pack years intensity and (56%) had >20 pack years.

**Co-morbidities at the Time of Presentation**

Hypertension (18%) was the most common co-morbid condition associated with CAP followed by congestive cardiac failure (8%). Diabetes was present in 6% of cases, while chronic kidney disease and chronic liver disease constituted 2% cases by each.

**Medication used for COPD**

Pneumonia was reported in 48% (n = 24) of patients who were on ICS containing regimen for COPD. Pneumonia was reported more in patients who were on fluticasone (28%) than in those on budesonide (10%). 6% patients were on oral steroids. 4% patients were on LABA. 2% was on LAMA. 10% were on SABA.

**General Physical Examination findings associated with Cap in COPD**

54% of the study group were anaemic and 16% had clubbing. 6% had pedal oedema.
Vital Signs at the Time of Presentation
In this study, raised temperature >38°C was noted in 22 (44%) patients. Tachypnoea defined by respiratory rate >25/min was noted in 20 (40%) patients. Tachycardia defined as pulse rate >100/min was noted in 28 (56%) patients. Hypotension defined as SBP <90 mmHg was noted in 8 (16%) patients. SpO2 <90% was noted in 15 (30%) patients.

Examination of the Respiratory System
In this study, crepitations were the most common respiratory system examination finding, which was noted in 32 (64%) patients. Rhonchi were noted in 31 (62%) patients. 32% showed bronchial breathing.

Lab Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean Value</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin</td>
<td>9.43 g/dl</td>
<td>(±1.908)</td>
</tr>
<tr>
<td>TLC</td>
<td>13,224</td>
<td>(±6937.61)</td>
</tr>
<tr>
<td>Neutrophils</td>
<td>76.72</td>
<td>(±10.41)</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>18.48</td>
<td>(±9.26)</td>
</tr>
<tr>
<td>RBS</td>
<td>128.06</td>
<td>(±55.10)</td>
</tr>
<tr>
<td>Blood urea</td>
<td>26.44</td>
<td>(±27.36)</td>
</tr>
<tr>
<td>Serum Creatinine</td>
<td>1.198</td>
<td>(±1.216)</td>
</tr>
<tr>
<td>AEC</td>
<td>440.2</td>
<td>(±251.64)</td>
</tr>
</tbody>
</table>

The mean haemoglobin value was 9.43 g/dl±1.90. The mean total leucocytes counts were 13,224±6937.61. Among leucocytes there was neutrophils predominance with mean value of 76.72±10.41. The total WBC counts varied from 2,200–39,200 cells/cmm.

ABG Analysis
Mean pH was 7.37±0.078 in this study. Acidemia was seen in 13 subjects among whom respiratory acidemia was seen in 12. Respiratory alkalosis was present in 4 subjects. Metabolic acidosis was present in 1 subject. Mean PaCO2 was 45.292 (±12.15) and mean PaO2 was 77.8 (±17.8). PaCO2 >50 mm of Hg was present in 9 cases whereas PaO2 <55 mm of Hg was present in 10 cases.

Radiological Findings in Chest X Ray
CXR Findings
Lobar consolidation was identified in 27 (54%) patients, bronchopneumonia in 13 (26%) patients, and interstitial pattern in 10 (20%) patients. COPD changes were noted in all 50 patients. “Cheddar cheese” pattern was seen in two cases. Right lung was involved in 24 (48%) patients, left lung in 14 (28%) patients and bilateral involvement was observed in 12 (24%) patients.

Aetiological Diagnosis

Sputum Gram Staining and Z-N Staining
Adequate sputum sample showing bacteriological positivity could be obtained in only 31 patients (62%). Of these 38% were gram negative bacilli, 22% were gram positive cocci and 4% were mixed. Sputum for AFB was positive in 1 patient.

Sputum Culture
Positive sputum culture was obtained in 30 patients (60%). Klebsiella pneumonia was the most common organism, isolated in 11 (22%) patients, followed by streptococcus pneumonia in 10 (20%) patients, Pseudomonas in 4 (8%), Haemophilus influenza in 4 (8%) and Staphylococcus aureus in 1 (2%) case.

Blood Culture
Two sets of blood culture were sent but only two patients had positive culture that showed Klebsiella pneumonia and Streptococcus pneumonia.

Two cases were followed to be non-resolving pneumonias which later turned out to be well differentiated squamous cell carcinoma and poorly.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confusion</td>
<td>6 (12%)</td>
</tr>
<tr>
<td>Uremia</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Respiratory rate &gt;30/min</td>
<td>19 (38%)</td>
</tr>
<tr>
<td>Systolic Blood Pressure &lt;90 mm Hg</td>
<td>8 (16%)</td>
</tr>
<tr>
<td>Age &gt;65 Years</td>
<td>11 (22%)</td>
</tr>
</tbody>
</table>

Severity assessment using Curb-65 Scoring System
CURB-65 is used to assess the severity. Confusion at the time of presentation was seen in 6 (12%), uraemia in 14 (28%), Tachypnoea in 19 (38%), hypotension in 8 (16%), and age >65 years in 11 (22%) cases.
Of the 50 patients with pAECOPD, median CURB-65 score was 1. Mild (0–1 score) was seen in 31 (62%), moderate (2 score) in 16 (32%) cases. 3 patients (6%) had CURB-65 score of more than 3 and therefore a high risk of mortality.

### Severity Assessment using Decaf Scoring System

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyspnoea</td>
<td>Va</td>
</tr>
<tr>
<td></td>
<td>Vb</td>
</tr>
<tr>
<td>Eosinopenia</td>
<td></td>
</tr>
<tr>
<td>Consolidation</td>
<td></td>
</tr>
<tr>
<td>Acidosis</td>
<td></td>
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<tr>
<td>Atrial Fibrillation</td>
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</tbody>
</table>

### Table 5: Decaf Parameters

DECAF is also used to assess the severity and is a mortality predictor. In the study population, dyspnoea of grade V at the time of presentation was seen in 22 (42%), eosinopenia in 22 (44%), consolidation in 50 (100%), respiratory acidosis in 12 (28%), and AF in 2 (4%) cases. Mild risk of mortality (0–1 score) was seen in 5 (10%), moderate (2 score) in 35 (70%) and severe in 10 (20%) cases.

### Complications

The most common complication noted was respiratory failure i.e. in 9 (18%) patients, followed by synpneumonic effusion in 3 (6%) patients. The other complications noted were lung necrosis, renal failure, septic shock, atrial fibrillation (4% each). ARDS was seen in one patient.

### Treatment and Management of Complications

All the patients were treated with empirical antibiotics. Some of them required supportive therapy with supplemental oxygen. Therapeutic aspiration was done in case of synpneumonic effusion in 3 (6%), vasopressors in case of septic shock in 2 (4%), non-invasive ventilator support in respiratory failure in 7 (14%), invasive ventilation in respiratory failure in 2 (4%) cases. Prolonged antibiotic therapy was required in patients complicated by lung necrosis and synpneumonic effusions.

### Outcome

Resolution of the consolidation was observed in 40 patients (80%). 2 cases that remained unresolved were later proved to be of malignant aetiology. Deaths occurred in 7 (14%) patients.

### Table 4: CURB 65 Score Severity

<table>
<thead>
<tr>
<th>Score-Severity</th>
<th>Number (N=50)</th>
<th>Deaths (N=7)</th>
<th>X²</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 1 Mild</td>
<td>31 (62%)</td>
<td>2</td>
<td></td>
<td>Non</td>
</tr>
<tr>
<td>2 Moderate</td>
<td>16 (32%)</td>
<td>3</td>
<td>0.01</td>
<td>Significant</td>
</tr>
<tr>
<td>≥ 3 Severe</td>
<td>3 (6%)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 6: Decaf score severity

<table>
<thead>
<tr>
<th>Score – severity</th>
<th>Number</th>
<th>Deaths</th>
<th>X²</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–1 Mild</td>
<td>5 (10%)</td>
<td>0</td>
<td></td>
<td>Non</td>
</tr>
<tr>
<td>2 Moderate</td>
<td>35 (70%)</td>
<td>0</td>
<td>8.51</td>
<td>Significant</td>
</tr>
<tr>
<td>≥ 3 Severe</td>
<td>10 (20%)</td>
<td>7</td>
<td></td>
<td></td>
</tr>
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</table>

### DISCUSSION

Improving the care of adult patients with community acquired pneumonia (CAP) has been the focus of many different organizations. Such efforts at improvement in care are warranted, because CAP, together with influenza, is a common serious medical problem all over the world with significant economic burden, morbidity and mortality.

It ranks as the third leading cause of death in US. In developing countries like INDIA, pneumonia is recognised as the most common cause for hospitalisation and remains a leading cause of death.

Despite the fact that the etiological agent in 50 % of CAP is unknown and the management of CAP is based on empirical antibiotics, it is observed in various clinical trials that the aetiological agents varies from one geographical area to another geographical area. Chronic obstructive pulmonary disease (COPD) is a frequent co-morbidity in patients hospitalised with community acquired pneumonia (CAP), which may be explained mainly by the altered local and systemic immunity associated with this condition.

There are studies done in different parts of the world on pneumonia in COPD. Previous studies dedicating to determine the specific characteristics of pneumonia in patients with COPD are scarce.

Additional information about characteristics of community-acquired pneumonia in patients with COPD,
showing some clinical and outcome particularities, and especially useful microbiological data to guide the development of more adequate empirical treatments had been shown in this study.

The present study is undertaken to determine the etiological agents in this geographical area, and also to study the clinical and radiological profiles, co morbid conditions, complications and mortality predictors in patients with COPD and concomitant pneumonia.

CONCLUSION
CAP is common among patients hospitalized with AECOPD and usually causes the exacerbation to have more severe clinical and laboratory parameters. Etiological agents cannot be identified in many cases because of difficulty in collecting sputum and lower yield of culture. Age >60 years, co morbidities mainly CHF, smoking, dyspnoea grade Vb (eMRCD dyspnoea scale), confusion, TC>11000, eosinophils <500/mm³, PaCO2 >50 mm Hg, PaO2 <55 mm Hg, CURB -score ≥3, DECAF ≥3, presence of respiratory failure were associated with increased mortality.

DECAF-score was a stronger mortality predictor than CURB-65 score. Prospective studies on larger number of patients are required to substantiate these findings.

REFERENCES