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"Microbiology and Outcomes of Community Acquired Pneumonia"

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Abstract :Background: *Community acquired pneumonia (CAP) is an acute illness acquired in the community with symptoms suggestive of lower respiratory tract infection (LRTI) together with the presence of a chest radiography of intrapulmonary shadowing which is likely to be new and has no clear alternative cause.* ***Objective****: To study the microbiology and different aetiologies of community acquired pneumonia (CAP), the complications associated with community acquired pneumonia, and the treatment outcomes.* ***Methods****: Cross sectional, prospective studydone at the Institute of Internal Medicine, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai from October 2016 to May 2017. 50 patients admitted with a clinical diagnosis of pneumonia were evaluated and non-infectious causes were excluded. Clinical data was collated and analysed.* ***Results:*** *Total of 50 patients were included in our study. Sputum staining showed gram positive organisms in 25 cases (50%), gram negative organisms in 12 cases (24%), mixed growth in 1 case (2%) and no organism in 12 cases (24%). Culture of the sputum yielded Streptococcus (most common), Staphylococcus, Klebsiella, Pseudomonas, E. coli, mixed growth or no organism. Involvement was unilateral in 92% and bilateral in 8% of cases. Complications included pleural effusion, lung abscess, circulatory failure and jaundice. 82% of patients were cured completely, 14% had a partial response to treatment, and 4% of patients died despite therapy.*

Keywords –*Community acquired pneumonia, Lower Respiratory tract infection, Consolidation, Microbiology*

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I. Introduction

Pneumonia is a disease known to mankind from antiquity. Pneumonia was described by William Osler as "The friend of the aged, allowing them a merciful relief from those cold gradations of decay, that make the last state of all so distressing". Community acquired pneumonia (CAP) is an acute illness acquired in the community with symptoms suggestive of lower respiratory tract infection (LRTI) together with the presence of a chest radiograph of intrapulmonary shadowing which is likely to be new and has no clear alternative cause.

Community acquired pneumonia is a common disorder with an incidence of about 20-30% in developing countries compared to an incidence of 3-4% in developed countries. The aetiology of CAP remains uncertain in many patients. Even with the use of extensive laboratory testing and invasive procedures, aetiological confirmation being achieved in no more than 45-70% of patients. Streptococcus pneumonia is the most commonly isolated pathogen.

II. Objectives

1. To study the microbiology of community acquired pneumonia (CAP)
2. To study the complications associated with community acquired pneumonia (CAP)

III. Methodology

Study design:
Cross sectional, Human subjects, unicenter, cross-sectional prospective study.
Study Centre:
Institute of internal medicine
Madras medical college and Rajiv Gandhi government general hospital, Chennai
Study duration:
October 2016 to May 2017
Inclusion criteria:
Patients with new or progressive pulmonary infiltrates on chest radiograph together with at least two of the following

1. Fever, cough, production of purulent sputum (or)
2. Leucocytosis>10,000/mm^3

Exclusion criteria:
Patients with radiographic or laboratory evidence suggestive of tuberculosis, acquired immunodeficiency syndrome (AIDS), leukaemia and those with chest infiltrates due to other causes such as congestive heart failure, pulmonary infarction, or obstructive pneumonia due to lung cancer, and patients receiving immunosuppressive treatment were excluded from the study.

Sample size:
50 patients

Methodology:
In all patients, chest radiograph, complete haemogram, renal and liver function tests, fasting blood sugar and serum electrolyte estimation were done. Sputum was examined and subjected to Gram's staining and bacterial culture on blood agar and MacConkey's agar media.

Observations:
In our study, Gram staining of sputum revealed Gram positive cocci in 50% of cases and Gram negative bacilli in 24% of cases. No organism was observed in 24% of cases.

Staining	**No. of cases**	**Percentage**
Gram positive	25	50
Gram negative	12	24
Mixed	1	2
No organism	12	24
Total	50	100

In our study culture of the sputum showed Streptococci (34%) as the most common organism isolated followed by Staphylococci (16%) as causative organisms of community acquired pneumonia. Klebsiella pneumonia accounted for 12% of cases and other gram negative bacilli were isolated in another 12% of the cases. In 24% of cases no pathogenic organism was isolated

Organism	**No. of cases**	**Percentage**
Streptococcus	17	34%
Staphylococcus	8	16%
Klebsiella	6	12%
Pseudomonas	4	8%
E. coli	2	4%
Mixed	1	2%
No organism	12	24%
Total	50	100%

In the present study, the incidence of pneumonia is more common on the right side (64%) than left side (28%) with right lower lobe (36%) to be the most commonly involved radiologically followed by left lower lobe (24%) and right middle lobe (20%). In 8% of cases bilateral involvement is present. More than one lobe involvement is observed in 8% of patients.

Localisation	**No. of cases**	**Percentage**
Unilateral involvement • Right lung • Left lung	46 • 32 • 14	92% • 64% • 28%
Bilateral involvement	4	8%
Right upper lobe	4	8%
Right middle lobe	10	20%
Right lower lobe	18	36%
Left upper lobe	-	-
Left lower lobe	12	24%
More than one lobe	4	8%

In our study the most common complication observed in CAP is circulatory failure (10%). Pulmonary complications were seen in 8% of cases (pleural effusion in 4%, lung abscess in 4%) and jaundice was present in 4%.

Complication	No. of cases	Percentage
Pleural effusion	2	4%
Lung abscess	2	4%
Circulatory failure	5	10%
Jaundice	2	4%

In our study, 82% of cases were cured completely emphasizing the curable nature of community acquired pneumonia and partial response was observed in 14% of cases, who required further investigations. Two patients (4%) with circulatory failure died.

Response	No. of cases	Percentage
Cured	41	82
Partial response	7	14
Death	2	4
Total	50	100

IV. Results

In our study, a total of 50 patients were included. Sputum was collected for analysis and showed gram positive organisms in 25 cases (50%), gram negative organisms in 12 cases (24%), mixed growth in 1 case (2%) and no organism in 12 cases (24%). Culture of the sputum yielded Streptococcus (most common), Staphylococcus, Klebsiella, Pseudomonas, E. coli, mixed growth or no organism. Involvement was unilateral in 92% and bilateral in 8% of cases. Complications included pleural effusion, lung abscess, circulatory failure and jaundice. 82% of patients were cured completely, 14% had a partial response to treatment, and 4% of patients died despite therapy.

V. Conclusion

Our study suggests that most patients with community acquired pneumonia at our institution are most commonly produced by Gram positive organisms, with Streptococcus being the most common cause. Involvement is predominantly unilateral, with the right lung being involved more commonly than the left. Complications such as pleural effusion, lung abscess, circulatory failure and jaundice develop in a small number of patients. Most patients are completely cured by treatment, though mortality still occurs in a minority of cases despite appropriate management.

VI. Limitations

1. Small sample size
2. Selection bias may have occurred as our hospital is a reference centre and the findings cannot confidently be extrapolated to the general populations

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