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A Study on Bacteriological Profile of Empyema Thoracis Patients in a Teritiary Care Hospital.

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Abstract:
BACKGROUND:
Empyema is the collection of pus in the pleural cavity secondary to infectious pleural or parenchymal diseases. Tuberculosis is the most etiology causing Empyema. Non- tuberculous infections resulting in Empyema are increasing these days and in the antibiotic era the microbiological profile was changing. In this scenerio the current study was undertaken to know the microbiological patterns among the empyema patients attending our institute.
MATERIALS AND METHODS:
In this prospective hospital based observational study, 75 cases with the diagnosis of Empyema, over a period of 18 months, were included. All the clinical details were noted, pleural fluid cultures were sent and the results were analysed.
RESULTS:
Mean age of the study population was 46.24years, with the male predominance of 80%. 36% had history of tuberculosis. Most common symptom was shortness of breath 90.6%. Most common etiology was tuberculosis followed by bacterial infections. Intercostal tube was inserted for all the cases. Pleural fluid analysis of 56.7% doesn't show any growth on culture and culture was positive in 43.2%, the most common organism isolated was Klebsiella.
CONCLUSION:
As tuberculosis was the most common causative agent of Empyema, most of cultures were sterile. Culture negativity among the non-tuberculous group can be explained by usage of antibiotics even before presenting to hospital. Analysing the microbiological patterns will help in the antibiotic policy of the institute and there by planning the empirical treatment even the culture reports arrives.
Key Words: *Empyema, Tuberculosis, pleural fluid culture.*

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I. Introduction

Empyema thoracis is the collection of pus in the pleural cavity which is seen across all the age groups.[1] From centuries tuberculosis remains as the most common etiological factor of Empyema. the incidence of non-tubercular cases of empyema were increasing in the recent past, along with them the microbiological pattern was also changing. Initially Gram positive organisms like streptococcus pneumonia and staphylococcus aureus used the predominant organisms, but in this antibiotic era and emerging drug resistance there is a rise in gram negative and anaerobic organisms with drug resistant species. Even among the tuberculous cases of empyema drug resistant species are increasing. Hence it is important to know the microbiological patterns of the disease in order plan the appropriate management, making the institutional antibiotic policy and early initiation of appropriate antibiotics empirically even before the culture report arrives. In this scenario the current study was undertaken to analyse the microbiological patterns of empyema cases in a government tertiary institute like ours where the lab facilities are limited and arrival of pleural culture report takes time.

II. Materials And Methods

This is a prospective hospital based observational study carried out among the patients in the department of pulmonary medicine at government hospital for chest and communicable diseases, Andhra medical college, Visakhapatnam. A total of 75 patients were above 18 years age and given consent were taken into the study.
STUDY DESIGN: A prospective, observational and analytical study.
STUDY POPULATION: 75 Patients with diagnosis the of empyema attending Government Hospital for Chest Communicable Diseases, visakhapatnam.
STUDY PERIOD: 2018 September -2020 August.

SAMPLING TECHNIQUE: Non probability convenient sampling technique.
EXCLUSION CRITERIA: patients aged less than 12 years, those who doesn't gave consent, pregnant women.
The clinical details like demography, clinical history, comorbidities of the population sample were noted. The investigations like routine blood investigations, sputum for CBNAAT and culture, Chest X-Ray, HRCT chest were sent along pleural fluid Analysis (TC,DC, AFB, CBNAAT, ADA, GLUCOSE, PROTEIN, CYTOLOGY) and culture. Etiological factor was established and All the patients were managed with ICD insertion and appropriate antibiotics. Patients for whom lung was not expanded with medical management, were reffered to CTVS department. Indications for surgery included pleural peel encasing the lung (trapped lung), multiloculated empyema, inadequate drainage of empyema despite chest tube, and persistent bronchopleural fistula with collapsed lung. Results were analysed in spss software.

III. Results

DEMOGRAPHY

The Youngest patient in the study was 14 years old and majority of the population sample is from 30 to 55 years age group (48%), with a mean age of 46.24years.

Table 1: AGE DISTRIBUTION OF CASES.

AGE	NO. OF CASES
< 15 YRS	2
15-30 YRS	13
30-55 YRS	36 (48%)
>55 YRS	24 (32%)

Out of 75 cases 80% (n=60) were males and 20% (n=15) were females
Majority of the population sample i.e,64%(n=48) were devoid of comorbidities, 19%(n=14) had diabetes and 17%(n=13) had hypertension.
Out of 75 cases 23(30.6%) had history of pulmonary tuberculosis. Among them 3 were previous treatment defaulters, 10 had active disease and had past history of pulmonary tuberculosis.
20 cases from the population sample were immunocompromised, among those 20%(n=4) were PLHIV patients, 70%(n=14) diabetics and 10%(n=2) were known cases of malignancy at the of presentation.
Majority of population sample were non-smokers i.e.,62% and 38% of cases were smokers. Out of 75 cases 65.3%(n=49) had habit of alcohol intake and 34% were non-alcoholics.

SYMPTOMMATOLOGY

Shortness of breath was the most common presenting complaint in the sample group, which was present in 90.6%(n=68) of patients, followed by cough 82.6% in patients, chest pain in 64% patients, fever 57.3% patients. Constitutional symptoms like loss of weight and loss of appetite were present in 42.6% (n=32) patients.

TABLE 2: SYMPTOMMATOLOGY

SYMPTOMS	NO. OF CASES	PERCENTAGE
Fever	43	57.3%
Cough	62	82.6%
SOB	68	90.6%
Chest pain	48	64%
LOA/LOW	32	42.6%

Most of the patients (81.3%) had tachypnea at the time presentation. Tachycardia was seen in 65.3% patients and hypoxia was present in 32%. Most of the patients (69.3%) had normal systolic blood pressure at the time of presentation.

Pleural fluid cell count of the population sample revealed a total cell count of >12000 in 45.3% cases (n=34). Differential count came to be lymphocytic predominant in 64% cases (n=48) and polymorph predominant in 36%(n=26). pleural fluid ADA was high i.e.,>70 IU/Dl in almost all the cases.

PLEURAL FLUID GRAM STAINING AND CULTURE SENSITIVITY PATTERNS

Out of 74 pleural fluid samples sent for gram staining and culture sensitivity, 33 samples (43.2%) showed Microbiological growth and 42 (56.7%) were sterile. Among them growth for klebsiella was seen in 15 cases, pseudomonas was seen 9 cases, E coli in 6 cases, 1 MRSA and 1 pneumococcus.

Table 3: PLEURAL FLUID GRAM STAINING AND CULTURE SENSITIVITY PATTERNS

PLEURAL FLUID G/S & C/S	NO. OF CASES
STERILE (No growth)	42 (56.7%)
E coli	6
Klebsiella	15
MRSA	1
Pneumococcus	1
Pseudomonas	9
TOTAL	**33 (43.2%)**

ETIOLOGY

Out of 75 cases 40 (53.3%) cases are of tuberculous in origin and 35 (46.6%) cases are of non- tuberculous in origin i.e, post pneumonic or parapneumonic in nature.

IV. Discussion

Empyema may be acute or chronic and may be localized or diffuse, and its development was described as triphasic namely Exudative phase, fibrinopurulent phase and organizing phase. Mean age of the population in our study was 46.24years, 48% majority of the population sample is from 30 to 55 years age group which is similar to the study done by Pulle MV et al,[1] among 285 cases of empyema, in their study 45.8% belongs to the age group 20-40 years and 48% belongs to age group of 21-40 years in the study done by Malhotra p et al.[2]

Male predominance of 80% was noted in our study, which is similar to 75.4% in Pulle MV et al [1] study and 75% in Malhotra p et al [2] study. Most common presenting complaint of the population sample in our study was shortness of breath, which was seen in 90.6%.

In western countries, Pulmonary infections like community acquired pneumonia, bronchiectasis and lung abscess are the commonest cause of thoracic empyema followed by surgical trauma. But in India tuberculosis accounts for a large number of empyema cases (38.6–65%).

In our study also, tuberculous empyema accounted for 53.3% of total empyema cases. Which is in accordance with the study done by Pulle MV et al,[1] among 285 cases of empyema, in their study tuberculous empyema constituted for 58.2% of cases.

Non- tuberculous bacterial infections constituted for 46.6% cases in our study which is also similar to 41.8% from Pulle MV et al [1] study.

In Majority of the population (56.7%) pleural fluid cultures were negative (sterile). This is because majority of the patients had tuberculosis as the underlying etiological factor where the cultures will be sterile. Secondly most of the cases had history of antibiotic usage prior to hospital presentation, which is also a major contributor for culture negativity.

Most common isolated organism in the among those who shown culture positivity in our study was Klebsiella (45.4%). The isolation of gram negative organisms in non-tuberculous cases of empyema was on increasing trend globally. Pseudomonas was the most common gram negative organism isolated in the non-tuberculous empyema cases globally.[1,4] Whereas staphylococcus aureus was the most common isolate from gram positive organisms causing Empyema.[4]

But in our study 94% cases with culture positivity were due to gram negative organisms like klesiella, pseudomonas and Ecoli. This wide variance in the microbiological patterns can be due to high number of hospital acquired infections and demographical diffecrences in our study.

V. Conclusion

From the current study, we can conclude that tuberculosis remains as the most common etiological factor for empyema. it highlighted emerging incidence of gram negative organisms as causative agents of empyema, and rises alarm of drug resistant species.

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