

ORIGINAL ARTICLE

Frequency of Bacteriological Organism in Patients with Thoracic Empyema

MUHAMMAD UMER SALIM¹, SYED MOHAMMAD UMAIR DILAWAR², SYED TABISH REHMAN³

¹Consultant Pulmonologist, Al-Noor Specialist Hospital, Makkah, Saudi Arabia

²Consultant Pulmonologist, Shaheed Mohtarma Benazir Bhutto Institute of Trauma, Karachi.

³Assistant professor, Chest Medicine department Liaquat National Hospital Karachi

Corresponding author: Syed Tabish Rehman, Email: drtabish.rehman@gmail.com, Contact No. +923332348981

ABSTRACT

Objective: To examine the frequency of bacteriological organism present in pleural fluid, in patients positive with thoracic empyema, assessed on the basis of pus culture test.

Study Design: Cross-sectional study

Place and Duration: Inpatient Department, Chest Medicine Ward 12, JPMC, Karachi, Pakistan for six months duration from 11 February 2019 to 10 August 2019.

Methodology: One hundred and thirty nine patients diagnosed with Thoracic Empyema were included in this study. All patients included in the study shall undergo Pus Culture Test prior to identify the presence or absence of bacterial organism. Those with positive bacterial findings (mainly Staph Aureus and gram negative organisms) were further assessed for stratification with reference to their possible variable affecters.

Results: There were 107 males and 32 females (%M: F ratio 77:23), with Empyema Thoracic, aged between 25-55 years and having a mean age of 36.28 year (\pm SD 8.206), were studied. The Pus Culture Test rate was 100% whereas duration of empyema was of average 18.38 days (\pm S.D 11.16). One hundred and four patients (74.82%) were carrying investigated bacteria which were staph. Aureus in 17 (12.50%) patients. GRAM NEGATIVE ORGANISMS in 87 (62.58%) patients. Echerea Coli in 12 (8.3%) patients, Pseudomonas. Aeruginosa in 46 (33.33%) patients, Klebsella in 17(12.50%) patients, Enterococcus Species in 12 (8.3%) patients. While remaining thirty five patients (25.17%) were found to have other bacteria, including Streptococcus, Proteus Mirabilis and Acinobacter, responsible for Empyema.

Conclusion: It is concluded that 74.82% patients had bacteria and among them 62.58% patients had gram negative organism. Pseudomonas Aeruginosa was the most common organism followed by Klebsella and staph. Aureus.

Keywords: Empyema, Thoracic, Pleural Effusion, Thoracentesis, Thoracostomy

INTRODUCTION

The Thoracic Empyema is the common clinical problem with different treatment options depending on the organism isolated. Main bacteria found in thoracic empyema include Pseudomonas aeruginosa, Escheria coli, Staphylococcus aureus, Klebsiellapneumoniae and Enterococcus species whereas; Pneumonia with parapneumonic effusion remains the most common etiology for Empyema (1, 2).

Thoracic Empyema is the accumulation of pus in pleura fluid. In addition, the pleural effusion giving positive bacterial culture or the presence of purulent content in pleural cavity is also categorized as Empyema (3-5). It occurs by the entrance of bacteria into the sterile pleural space by overwhelming the defense mechanisms of normal pleura. Transpleural migration following pneumonia is considered as the most common mode of bacterial entry (2, 6). It develops due to the transformation of infected pleural fluid from free flowing fluid to complex inflammatory collection [7]. Approximately 10% of patients with pneumonia developed Empyema and 2/3rd of these cases had been diagnosed to have Streptococcus pneumonia as predominant organism but with the advent of antibiotics, Staphylococcus species became more prevalent and recently, penicillin resistant Staphylococcus, gram negative bacteria are increasing in incidence [8].

The main symptoms of Empyema are generally non-specific. However, 80% of patients have dyspnea and fever, whereas 70% complain regarding cough or chest

pain. Thus, evidence of fluid in the pleural space is the main radiographic finding [9].

The anaerobic organisms are cut-off from up to 75% of empyema patients, whereas half of the isolates are based on only anaerobic organisms and the other half is mixed with anaerobic and aerobic organisms. Hence, 75% of empyema patients have multiple infecting organisms that found in average three bacterial species per patient. Anaerobic bacteria in the pleural space may develop in mouth or from a subphrenic source through transdiaphragmatic spread that more or less reach to the pleura by means of the bloodstream. In spite of cautious sampling and thorough culturing, pleural fluids are culture-negative in up to 20% of empyema patients (3, 10).

Geography also has an impact on microbiology, for instance, majority of the pleural infections are caused by gram-positive streptococci in UK. Streptococcus pneumonia is responsible for 21% of such cases, Staphylococcus aureus in 10% whereas 24% account for the Streptococcus milleri group including Streptococcus anginosus, Streptococcus constellatus, and Streptococcus intermedius. On the other hand 10% of the cases are due to gram-negative organisms especially in patients suffering from co morbid conditions like diabetes. They include Escherichia coli, Klebsiella spp, Haemophilus influenzae and Pseudomonas spp. Some studies have shown rate higher than 12%-34% for anaerobic pathogens (3, 10). The prevalence of Empyema is 65% for tubercular and 30% for

the one developed as a complication of bacterial pneumonia.¹²

The aim of this study is to determine the current bacteriological profile in our local Empyema patients. Literature search has shown that only few studies regarding local data are available. The result of this study aids information on local bacteriological data including presence of new bacteria, their sensitivity to the common antibiotics, which will help healthcare professionals to manage such kind of patients.

MATERIALS AND METHODS

This cross-sectional study was conducted at Inpatient Department, Chest Medicine Ward 12, JPMC Karachi, Pakistan for Six months duration from 11 February 2019 to 10 August 2019. Total 139 patients with both genders presented with thoracic empyema were included. After taking written consent from all the patients, detailed demographics including age, sex, and duration of Empyema at the time of diagnosis will be recorded. Patients with chylothorax, pseudochylothorax, haemothorax, and patients with malignant effusion were excluded from study.

Required investigation like pus culture test will be done from pleural fluid aspiration. It will be performed according to the BTS guidelines 2010 of Empyema. Then the collected pleural fluid sample will be sent to the DOW LAB for PUS CULTURE TEST and will be recorded on proforma on outpatient follow up. Data will be entered and analyzed by using SPSS version 19. Continuous variables like age, duration of Empyema will be expressed as Mean \pm S.D. Categorical variables like, gender, bacteriological organism and pus culture test (positive/negative) will be expressed in frequencies and percentage.

RESULTS

There were 107(76.97%) males and 32(23.02%) females. Mean age of the patients was 36.28 with the standard deviation of ± 8.206 years. Mean of duration of Empyema symptoms is 18.38 with the standard deviation of ± 11.16 . (Table 1)

Table No 1: Baseline details of all the patients

Variables	Frequency No.	%age
Mean Age (Yrs)	36.28 \pm 8.206	-
Mean Duration of Symptoms	18.38 \pm 11.16	-
Gender		
Male	107	76.97%
Female	32	23.02%

One hundred and four patients (74.82%) were carrying investigated bacteria which were staph. Aureus in 17 (12.50%) patients. GRAM NEGATIVE ORGANISMS in 87 (62.58%) patients (Table 2).

Table 2: Frequency Distribution of Gram Negative Organism

Gram -ve organism	Frequency	Percentage
Yes	87	62.43%
No	52	37.57%
Total	139	100%

Echerea Coli in 12 (8.3%) patients, Pseudomonas. Aeruginosa in 46 (33.33%) patients, Klebsella in 17(12.50%) patients, Enterococcus Species in 12 (8.3%) patients. While remaining thirty five patients (25.17%) were found to have other bacteria, including Streptococcus, Proteus Mirabillis and Acinobacter, responsible for Empyema. (Figure 1)

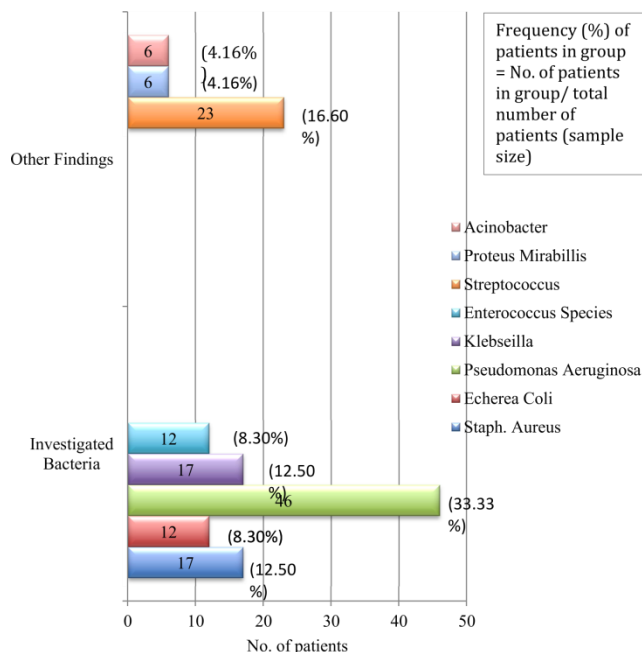


Figure No 1: Bacterial Findings in Patients

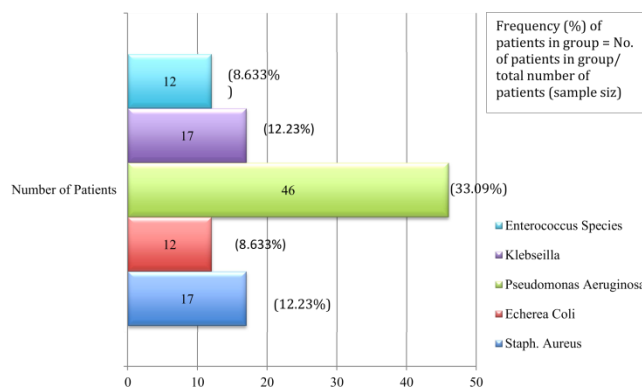


Figure No 2: Investigated Bacterial Findings in Patients

DISCUSSION

It was reported by Nelson that 54% of the empyemas in youngsters ≤ 6 months of age were caused about by *S. aureus* out of which just 6% were sterile¹¹. On the other hand the figures drop significantly in kids suffering from Empyema in the age range of 0.5-2 and 2-5 years where it was *S. aureus* in 20%, by *S. pneumoniae* in 25%, and by *H. influenzae* in 20% and 10%, separately¹¹.

S. aureus is a commonly basic reason for empyema in generally healthy grown-ups, in youngsters, and in patients who have had mid-section injury or surgery. *S. aureus* pneumonia and empyema have been connected to former influenza A virus infection¹². Empyema confounding

traumatic hemothorax inclines patients to disease with *S. aureus*, while pneumothoraces or serous radiations are frequently optionally tainted by vigorous gram negative bacilli.

The bleakness and mortality connected with pleural empyema are influenced by the microbial etiology, host resistance deformities, seriousness and length of time of infection, and amplexness of anti-microbial treatment and waste. Patients with polymicrobial or safe gram-negative bacillary empyema frequently are elderly, have nosocomial contamination confounding serious hidden ailment, and might pass on at rates in the scope of 40%-70%^(13, 14). Among generally sound youthful patients, death rates are 2%-15%, contingent upon the length of time and seriousness of their disease^(15, 16).

CONCLUSION

We concluded that 74.82% patients had bacteria and among them 62.58% patients had gram negative organism. *Pseudomonas Aeruginosa* was the most common organism followed by *Klebsiella* and *staph. Aureus*.

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