



EMPYEMA THORACIS: THE LION THAT REFUSES TO BE TAMED

General Surgery

**Dr. Pritam
Rajendra Jaiswal**

MBBS, Resident, Department of General Surgery, Dr. Vasantrao Pawar Medical College, Hospital and Research Centre, Nashik.

Dr. Mandar Vaidya

M Ch (Paediatric Surgery), Professor, Department of General Surgery, Dr. Vasantrao Pawar Medical College, Hospital and Research Centre, Nashik.

ABSTRACT

Empyema Thoracis is a disease of historical importance and still a modern menace. This study looks at new translational research themes, highlighting areas of clinical research, as well as reviewing the current best clinical therapy of pleural infection. It was a Prospective, Observational Study conducted on patients of all age groups with clinical evidence of infection on the basis of fever and pleural effusions. ICD insertion, USG guided aspiration or decortication was performed depending upon the patient's requirements. The patients were followed up for 6 months and the outcome was assessed. A total of 29 patients were enrolled in sex ratio of 1.07:1 (M:F), with cough being the most common symptom. Out of 29 cases, 18 (62.07%) patients were cured, 5 (17.24 %) patients had a failure in their treatment mode and 6 (20.69 %) patients died during the treatment.

KEYWORDS

Empyema Thoracis, Tuberculosis, Decortication, VATS, Intercostal Drainage

INTRODUCTION

Empyema Thoracis is a disease of historical importance and remains a modern menace, with the incidence rising in adults and children. Hippocrates defined Empyema Thoracis as a "collection of pus in the pleural cavity" in 600 B.C.^[1] Light defined Empyema Thoracis as "the presence of thick purulent fluid in the pleural cavity", i.e., if the fluid contains gross pus, or organisms on gram stain, or a pH < 7, or low glucose level (<40 mg/dl).^[2]

Empyema thoracis has a significant mortality rate ranging from 6% to 24%. Most occurrences of empyema are complications of community- or hospital-acquired pneumonia, but others are caused by iatrogenic factors or develop without pneumonia.^[3]

This study looks at new translational research themes, highlighting areas of clinical research, as well as reviewing the current best clinical therapy of pleural infection.

MATERIAL AND METHODS

A Prospective, Observational Study was conducted on patients of all age groups with clinical evidence of infection on the basis of fever and pleural effusions and who fulfilled the following criteria:

- Frank pus or purulent fluid on diagnostic aspiration,
- Positive pleural fluid culture,
- Positive fluid gram stain.

Patients having Empyema secondary to: 1. Penetrating or blunt trauma, 2. Any surgical procedure 3. Associated with connective tissue disorders were excluded from the study.

The study was conducted for a Period of two years from July 2020 to December 2022.

Written and Informed consent was obtained. Detailed demographic and clinical parameters including age, sex and symptoms were evaluated. Presence of any comorbidities like diabetes mellitus, COPD, smoking, alcoholism, previous history of tuberculosis was documented. Chest radiographs were obtained in all patients at the time of admission, after ICD insertion and removal, and at the time of discharge. Ultrasonography and computed tomography were done only if clinically indicated. Pleural fluid was collected aseptically and was subjected to gram staining, AFB staining and culture and sensitivity.

Closed thoracostomy was performed with a straight chest tube attached to an underwater seal. USG guided tube placement was done when fluid was loculated. Continuous drainage was maintained until fluid was serous and daily collection <30 ml. In cases of multi-loculated empyema, serial USG guided aspirations were done. For the first 2 weeks, I/V antibiotics were given followed by oral antibiotics and/or anti-tubercular drugs (in Tubercular patients). Antibiotics were

initially given empirically and subsequently changed based on the culture and sensitivity report. Tubercular patients received category 1 or 2 ATT drugs under DOTS strategy of WHO. All patients were followed up for a minimum period of 6 months.

Response or Outcome was defined as following:

Cure: Complete resolution of symptoms, normalization of laboratory markers of infection/inflammation and complete lung expansion with residual pleural thickening of <2 cm in chest X-ray PA View.

Failure: Recurrence or persistence of Broncho Pleural Fistula after medical and surgical management.

Death: Death due to the disease process

RESULTS

29 patients were selected for the study, of which 14 were female and 15 were male. The mean age of the study was 43.76 years.

Age in years	Frequency (N)	Percentage (%)
10 - 20	3	10.34
21 - 30	6	20.69
31-40	6	20.69
41 -50	2	6.90
51 -60	4	13.79
61 - 70	5	17.24
71 -80	3	10.34
Total	29	100
Mean	43.76 years	

The commonest symptom at presentation was cough, seen in 21 patients (72.41 %) followed by fever (19, 65.52 %), breathlessness (12, 41.38%), chest pain (8, 27.59%), haemoptysis (5, 17.24) and weight loss (1, 3.45%).

Clinical feature	Frequency	Percentage (%)
Cough	21	72.41
Chest pain	8	27.59
Breathlessness	12	41.38
Fever	19	65.52
Haemoptysis	5	17.24
Weight loss	1	3.45

History of tuberculosis was available in 11 patients (37.93%), and of COPD in 1 patient (3.44%). In the present series, 4 patients (13.79%) were diabetic, 5 patients (17.24%) were smokers, 7 patients (24.14%) were alcoholics. 10 patients (24.48%) had no comorbidity.

Mycobacterium tuberculosis was isolated in 11 patients (37.93%), while Staphylococcus aureus was isolated in 8 (27.59%) and Streptococcus pneumoniae in 5 (17.24%). In 5 patients (17.24%), the pus was sterile.

Out of the 29 cases, 7 (24.14 %) were treated with thoracotomy

decortication, 4 (13.79 %) underwent VATS and 18 (62.07 %) were treated with Intercostal chest tube drainage (ICD).

Organism isolated	Frequency (N)	Percentage (%)
Mycobacterium tuberculosis	11	37.93
Staphylococcus aureus	8	27.59
Streptococcus pneumonia	5	17.24
No organism growth	5	17.24
Total	29	100

Out of 29 cases, 18 (62.07%) patients were cured, 5 (17.24 %) patients had a failure in their treatment mode and 6 (20.69 %) patients died during the treatment.

DISCUSSION

About 50 years ago, the American Thoracic Society divided the progression of empyema into three stages: the exudative phase, the fibrinopurulent phase, and the organizing phase.^[4] The empyema may initially be lying freely in the pleural cavity before becoming encased by fibrinous pleural adhesions. It will thicken up when the fluid content is absorbed. Within 7–10 days of the effusion's commencement, fibrin deposits cause the pleura's surfaces to develop a thickened peel. If appropriate treatment is offered at this stage, the lung can fully expand without suffering any functional limitations. Empyema still affects many people in developing nations despite improvements in management techniques in the early stages.^[5]

In the current study, 6 (20.69%) cases were in the range between 21–30 years and 31–40 years of age. The mean age of the study was 43.76 years with SD +/- 19.37.

A study conducted by **Duygu Ozol et al** reported a mean age of 47.97 +/- 17.1 years, ranging between 21 and 76 years. The findings were in accordance with the present study findings.^[6]

In the current study, out of 29 patients. 14 (48.28%) were female, and 15 (51.72%) were male. Gender distribution is almost the same in the study with slight male predominance with a ratio of 1.07: 1. This can be because of their tall stature and demanding jobs; men are typically more susceptible to mechanical stresses. Males are more likely to smoke, and they are also more likely to develop COPD and tuberculosis.^[7]

In the current study, the commonest symptom at presentation was cough, seen in 21 patients (72.41 %) followed by fever (19, 65.52 %), breathlessness (12, 41.38%), chest pain (8, 27.59%), haemoptysis (5, 17.24) and weight loss (1, 3.45%).

A comparable study conducted by **Kamath^[8] et al** reported cough (94%) to be the most common symptom. This was followed by fever (76%), chest pain (75%), and dyspnea (53%). In another identical study by **Sony^[9] P. S et al** reported a common symptom of chest pain (46.4%) followed by dyspnoea and cough. Other symptoms like cough, expectoration, fever, and hemoptysis were also present. Constitutional symptoms like malaise, anorexia, and weight loss were present in 25 patients (44.6%).

Depending on the type of infecting organism and how effectively the patient's immune system is functioning, an empyema can present in a variety of clinical ways.^[9]

In the current study out of 29 cases, a maximum of 11 (37.93%) cases had tuberculosis, 10 (24.48 %) had no comorbidities, 7 (24.14%) cases were addicted to alcohol drinking, 5 (17.24 %) cases did smoking, 4 (13.79 %) had diabetes Miletus and 1 patient with chronic obstructive pulmonary disease.

In the study conducted by **Sony^[9] P. S et al** reported Diabetes mellitus as the most common comorbidity in the study population (57.1%). Other comorbidities were systemic hypertension, chronic obstructive pulmonary disease, and coronary artery disease. A history of pulmonary tuberculosis was seen in 8 patients (14.2%).

In the current study out of 29 cases 11 (37.93) cases were isolated with mycobacterium tuberculosis organism, 8 (27.59%) cases had staphylococcus aureus isolated, 5 (17.24%) cases were isolated with streptococcus pneumonia and 5 (17.24%) cases had no organism detected.

In the study conducted by **Sony^[9] P. S et al** Streptococcus viridans was

isolated from culture from lung abscess and empyema in humans. Streptococcus viridans is frequently isolated with anaerobes in patients with empyema, despite the fact that anaerobic bacteria are also recognized to be the cause of lung abscess and empyema. This shows the aspiration or oropharyngeal source of the infection.^[100]

Another identical study conducted by **Preetam Rajgopal Acharya^[7] et al** reported gram-negative bacilli were isolated most frequently from empyema fluid in 11 patients (27.5%), while mycobacteria were cultured in 6 (15%) and staphylococcus in 5 (12.5%). In 22 patients (55%), the pus was sterile.

In the current study, 7 (24.14 %) cases underwent thoracotomy decortication, 4 (13.79 %) were treated with VATS and 18 (62.07 %) cases were treated with Intercostal chest tube drainage (ICD).

In the comparable study conducted by **Sony^[9] P. S et al** reported 4 (7.14 %) of patients treated with medical management, 46 (82.1 %) cases were treated with VATS and 6 (10.70 %) patients were treated with thoracotomy decortication.

In the comparable study conducted by **K. Ramireddy et al** 51.72% (n=30) cases were treated by intercostal tube drainage, antibiotics, and 22.41% (n=13) cases were treated by ICT drainage and decortication and only 1 case was treated by aspiration due to the presence of the small amount of pus.^[10]

In the current study, 18 (62.07%) cases were cured. 5 (17.24 %) cases had a failure in their treatment mode and 6 (20.69 %) cases died during treatment. The recovery rate reported in the present study is 62.07 %.

CONCLUSION

Even in this modern era of technological improvement, the incidence of empyema is rising. Based on the clinical situation and underlying aetiology, empyema is being managed.

It is recommended that a single protocol should be developed and implemented across all facilities, from primary care facilities to tertiary care facilities, in order to effectively manage empyema before it develops and lower the incidence of empyema and its related consequences.

REFERENCES

- Adams F: The genuine works of Hippocrates. Baltimore William and Wilkins Company.1939; p51-2.
- Light RW, Girad WM, Jenkinson SG et al. Parapneumonic effusion. Ann J Med 1980; 69: 507-11
- Teixeira LR, Sasse SA, Villarino MA, Nguyen T, Mulligan ME, Light RW. "Antibiotic levels in empyemic pleural fluid". Chest.2000; 117(6): 1734
- Andrews NC. Management of nontuberculous empyema: a statement of the subcommittee on surgery. Am Rev Respir Dis. 1962;85:935.
- Sony P. S., Vinu C. V., Suresh Kumar J., Kishore Lal Thoracic empyema: clinical course and management in Trivandrum Medical College Int J Res Med Sci. 2021 Sep;9(9):2681-2686.
- Ozol, D., Oktom, S., & Erdinc, E. (2006). Complicated parapneumonic effusion and empyema thoracis: microbiologic and therapeutic aspects. *Respiratory medicine*, 100(2), 286–291.
- Preetam Rajgopal Acharya, Kusum V. Shah Empyema thoracis: A clinical study Ann Thorac Med. 2007 Jan-Mar; 2(1): 14–17
- Kamat. A prospective study of 100 cases of chronic empyema in Bombay. Lung India 1985;3:15-9
- Empyema DS, Seaton A, Seaton D, Leitch AG, editors. In: Crofton and Douglas's respiratory diseases. 5th ed. Blackwell Science Ltd: Oxford; 2000. p. 445-58
- K. Ramireddy, Y. Siva Rama Krishna. A study of pediatric empyema thoracis in a tertiary care hospital. International Journal of Contemporary Medical Research 2016;3(10):2838-2840.