

Original Research Article

A Study of Clinical Profile of Empyema Thoracis Patients in Tertiary care center at Agra

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Abstract

Background: Pleural infection is one of the oldest and most severe diseases. Prompt recognition of the development of empyema is crucial to successful treatment. Even with appropriate therapeutic attempts, mortality of patients is 15-20% and higher in immunocompromised patients. The present study was carried out to study the clinical profile of empyema thoracis patients in a tertiary care center.

Methods: 56 patients were included in this prospective study who were diagnosed as case of empyemas thoraces over a period of 12 months. An evaluation of clinical features, associated risk factors or co-morbidities, causative organisms, treatment modalities and outcome of these patients was carried out.

Results: There were 56 patients included in the study out of which, 52% patients belonged to age group 18-40 years with a significant male preponderance. 75% patients were of tubercular origin and rest were of bacterial origin, most commonly, *Staphylococcus aureus*, followed by gram negative bacilli. Most frequently associated co-morbidity was found to be Pneumonias followed by diabetes, smoking and alcohol abuse. Most commonly used management modality was ICT drainage which provided maximum drainage and also reduces the hospital stay.

Conclusion: Empyema thoracis has a very high prevalence in developing countries like India. Amongst which, tubercular empyemas, being most common in young adults is a major cause of morbidity and mortality.

Keywords: Empyemathoracis, Pneumonia, Tuberculosis.

Introduction

Empyema Thoracic is a disease of historical impotence and still a modern menace, with incidence rising in adults and children, and a significant mortality in adults. Hippocrates

defined Empyema Thoraces as collection of pus in the pleural cavity in 600 B.C⁽¹⁾. Light defined it as “the presence of thick purulent fluid in the pleural cavity”, I.e., if fluid contains gross pus, or organisms on gram stain, or a pH<7, or a very low

glucose level (<40mg/dl) ⁽²⁾. There are three stages of Empyema: Exudative, when there is an increase in pleural fluid with or without the presence of pus; fibrinopurulent, when fibrous septa form localized pus pockets; and the final organizing stage, when there is scarring of the pleural membranes with possible inability of the lung to expand. Typical symptoms include cough, chest pain, shortness of breath and fever. Chest X-ray and Ultrasound of thorax are the initial investigations that are done although; CT and MRI thorax can also be done. Good pleural fluid and empyemas penetration has been reported in adults for penicillin's, ceftriaxone, metronidazole, clindamycin, vancomycin, gentamycin and ciprofloxacin⁽³⁾⁽⁴⁾. Bacterial and white cell metabolism can rapidly turn a simple exudative Para pneumonic effusion into a multiloculated purulent empyema with low pH and high lactate dehydrogenase levels. This progressive process involves alterations in fibrin turnover, which leads to the formation of fibrinous deposits and membranes with sequestration of infected fluid ^(5,6). The empyema commission formed to address the high mortality rates secondary to the institution of open drainage in all cases of empyema occurring in American soldiers during the World War I laid emphasis on the following principles: 1. The necessity to drain the pleural fluid and the need to avoid an open pneumothorax in the acute pneumonic phase, 2. The rapid sterilization and obliteration of the infected cavity in order to avoid a chronic empyema and 3. Proper nutrition of the patient. The same guidelines framed decades ago continue to provide the basis for the treatment of empyemas even today ⁽⁷⁾. Tube thoracostomy, image directed catheters, thoracoscopic drainage, intrapleural thrombolytics, decortications and open drainage have all been used with success rates ranging from 10 to 90 %^(8,9). The variable success rates of these procedures can be attributed, in part, to the stage of the empyema at presentation.

Material and Method

Study Design: This study was a hospital based prospective observational study carried out in patients of empyema thoracis.

Study Material: It included clinically diagnosed patients of empyema thoracis presenting to Department of T.B. & Chest Diseases, S.N. Medical college, Agra between March 2016 and March 2017 of age>18 years who were stable and interested in participating in our study, filling into inclusion criteria and having none of exclusion criteria, were enrolled into the study.

Inclusion criteria: All patients of empyema thoracis irrespective of cause and presentation.

Exclusion criteria

(1) Age less than 18 years;
 (2) Empyema secondary to penetrating or blunt chest trauma;
 (3) Empyema secondary to any surgical procedure
 Detailed demographic and clinical parameters including age, sex, symptoms(shortness of breath, chest pain, fever, weight loss, cough, sputum, hemoptysis) were evaluated in all patients fulfilling the case definition. Presence of any co-morbidities like pneumonia, diabetes mellitus, chronic obstructive pulmonary disease, smoking, alcoholism, I/V drug abuser, previous history of anti TB drugs was documented. Chest radiographs were obtained in all patients at the time of admission, after icd insertion, after icd removal, and at the time of discharge.while Ultrasound (USG) and computed tomography (CT) were done if found necessary. Pleural fluid was collected aseptically by thoracocentesis was subjected for gram staining, AFB staining and culture and sensitivity and also for Culture by MGIT method. Anaerobic culture was carried out in those suspicious of anaerobic empyema(patients with history of aspiration, alcoholism, seizure, periodontal disease). Other investigations that were conducted on the patients included complete blood count (CBC), renal function test, liver function test, HIV serology, random blood sugar, and sputum for AFB. Closed thoracostomy was carried out with a straight chest tube 28-32 F

Malecot’s catheter) 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 was less than 30 ml pleural cavity was obliterated by lung re expansion and any BPF was sealed. In cases of multi-loculated empyemas where ICD insertion was not beneficial, 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). Antibiotic were given initially empirically and subsequently changed on the basis of the culture and sensitivity report. Tubercular patients received category 1 or 2 ATT drugs under DOTS strategy of WHO in addition to initial 2 weeks of I/V antibiotics. All patients were followed up for a minimum period of 6 months. Outcome was defined as one of the 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 BPF after medical and surgical management.

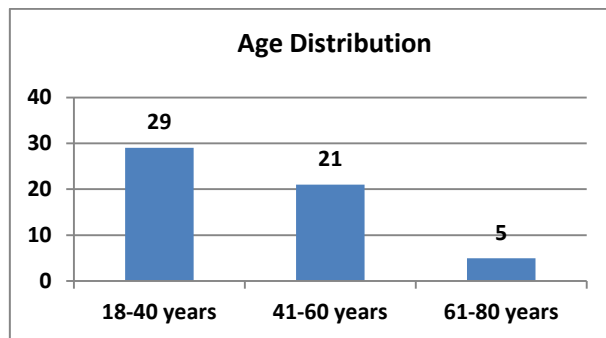
Death: Death during the course of illness due to the disease process

Result

Age: There were total 56 patients amongst whom 29 patients (52%) belonged to age group 20-40 years, 21 patients (38%) belonged to the age group of 41-60 years and 5 patients (10%) were of age between 61-80 years. Maximum patients lied in the age group 41-60 years but significant number of patients (43%) belonged to the 20-40 years of age group as well. (Table-1) (Graph-1)

Table-1 Distribution on the basis of age

Age Groups (years)	No. of patients	
	No.	%
18-40	29	52%
41-60	21	38%
61-80	5	10%
Total	56	100%

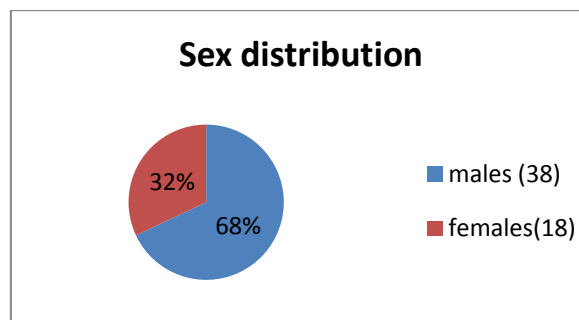


Graph-1

Sex: Amongst total 56 patients, 38(67.85%) were males and 18(32.14%) were females, overall there was a male preponderance in the affected patients. (Table-2) (Graph-2)

Table-2 Distribution on the basis of sex

Sex	Cases	
	No.	%
Male	38	68%
Female	18	32%
Total	56	100.00

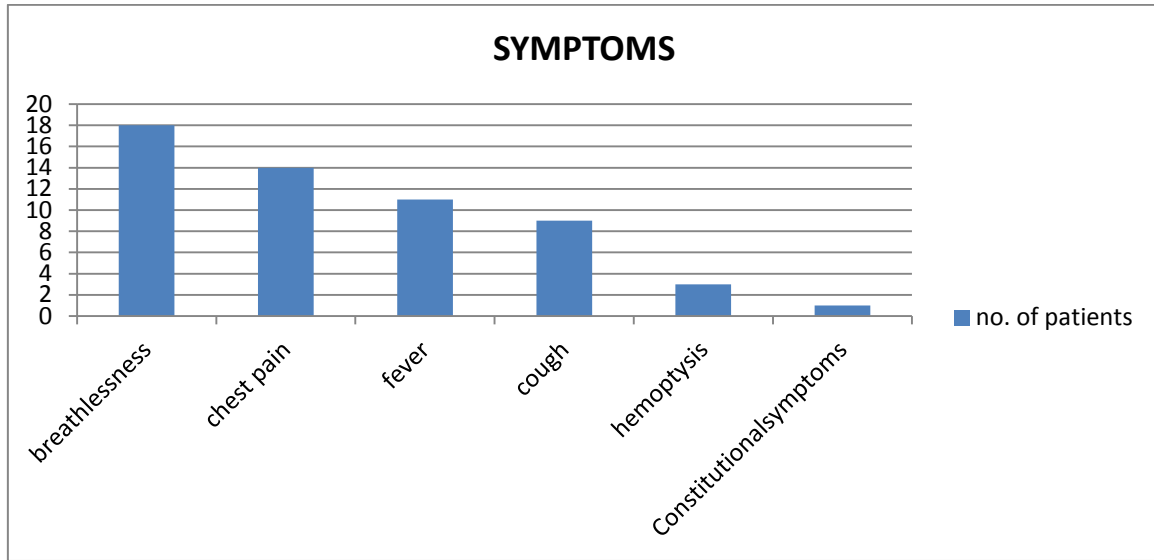


Graph-2

Clinical features: The most common presenting symptom was found to be breathlessness, followed by chest pain and fever in our study. (Table-3) (Graph-3)

Table-3 Distribution on the basis of symptoms

Symptom	No. of patients	%
Breathlessness	18	33
Chest pain	14	25
Fever	11	20
Cough	9	16
Haemoptysis	3	5
Constitutional symptoms	1	1

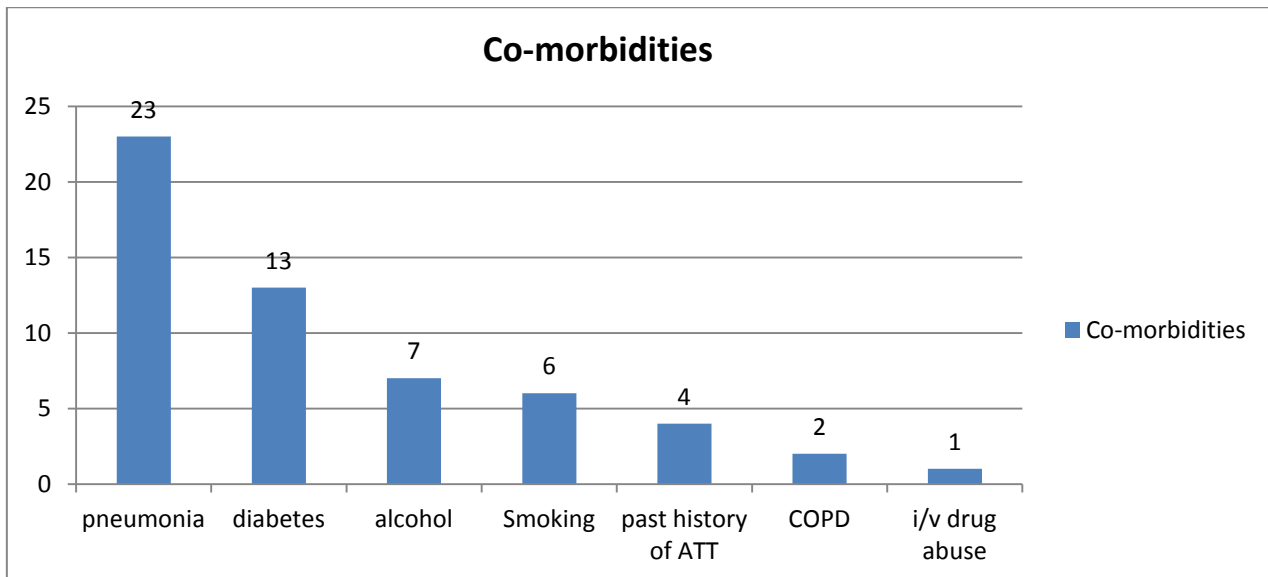


Graph-3

Risk Factors: Most common risk factor which was associated with empyemas came out to be underlying pneumonias, followed by diabetes mellitus. (Table-4) (Graph-4)
 Association of smoking and alcohol with empyema came out to be almost equivalent in our study.

Table-4 Co-morbidities and risk factors

Co-morbidities	No. of patients	Percentage%
Pneumonia	23	41
Diabetes	13	23.5
Alcohol	7	12.5
Smoking	6	11
Past history of ATT	4	7.5
COPD	2	3
i/v drug abuse	1	1.5



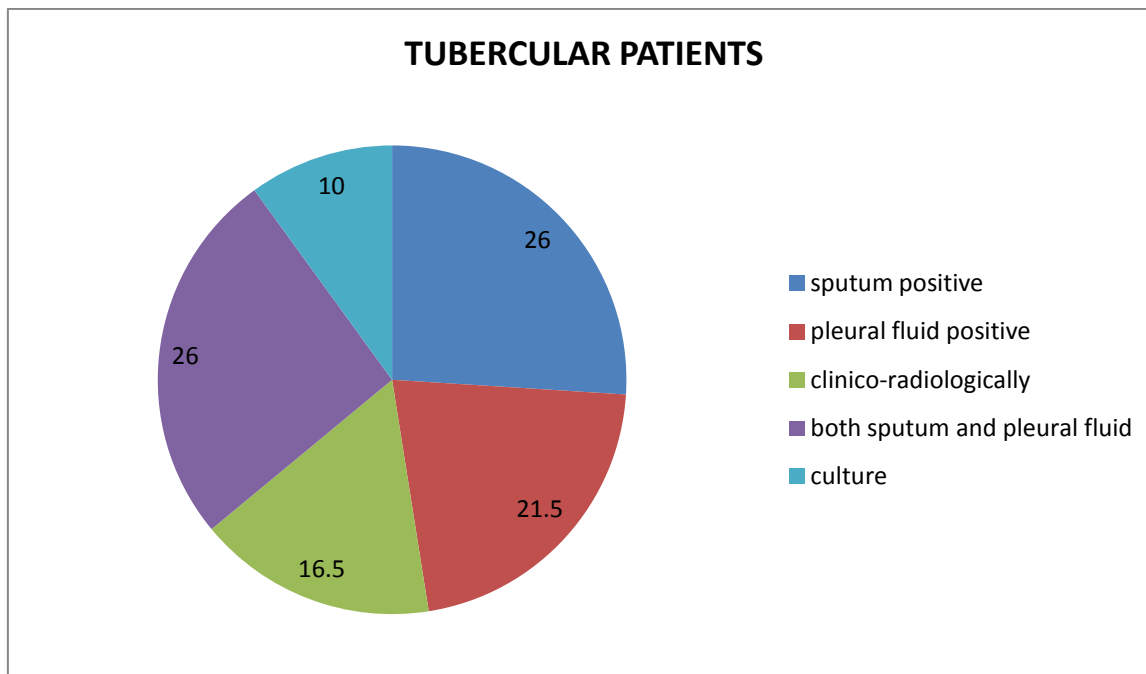
Graph-4

Causative organism: Out of 56 patients included in our study, 42 patients were tubercular, either proven by detection of AFB in sputum or/and pleural fluid or clinico-radiologically suggestive of active Tuberculosis or a positive culture for

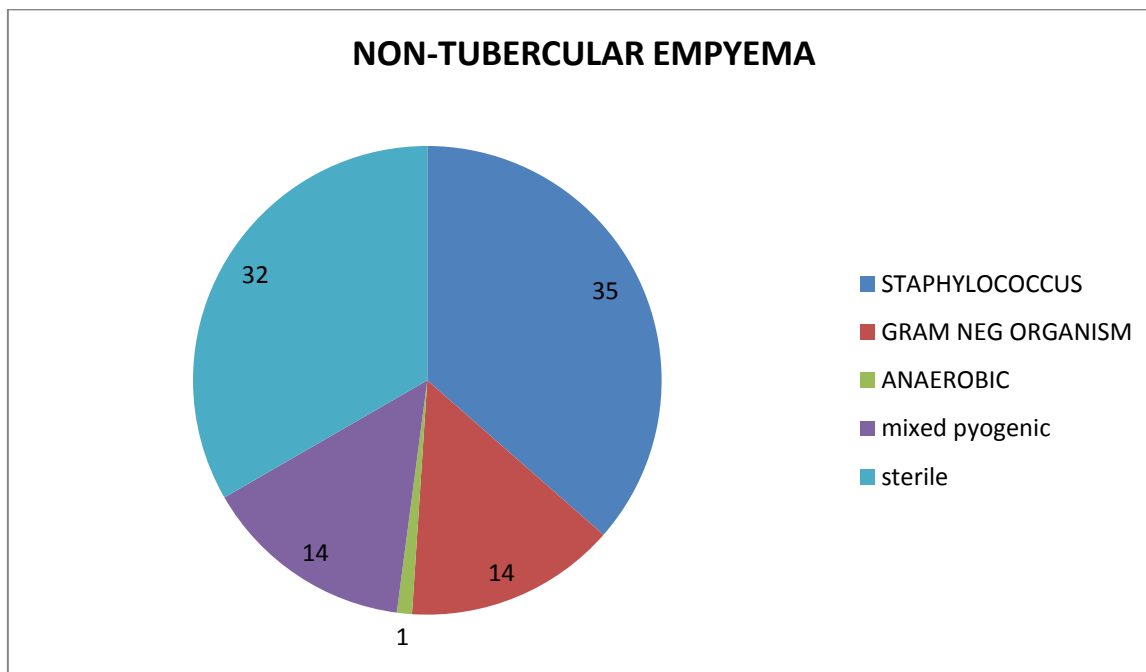
MTB in the pleural fluid aspirate and /or Sputum. (Table-5)(Graph-5)(Graph-6)
 Amongst the other 14, most common causative organisms was Staphylococcus, followed by gram negative bacilli

Table-5 Causative organism

Tubercular empyemas	No. of cases(%)	Non tubercular empyemas	No. of cases (%)
Sputum positive	11(26)	Staphylococcus aureus	5(35)
Pleural fluid	9(21.5)	Gram negative bacilli	2(14)
Clinico-radiologically	7(16.5)	Anaerobic	1(6)
Both sputum and Pleural fluid positive	11(26)	Mixed pyogenic	2(14)
Culture by MGIT method	4(10)	Sterile	4(32)



Graph-5



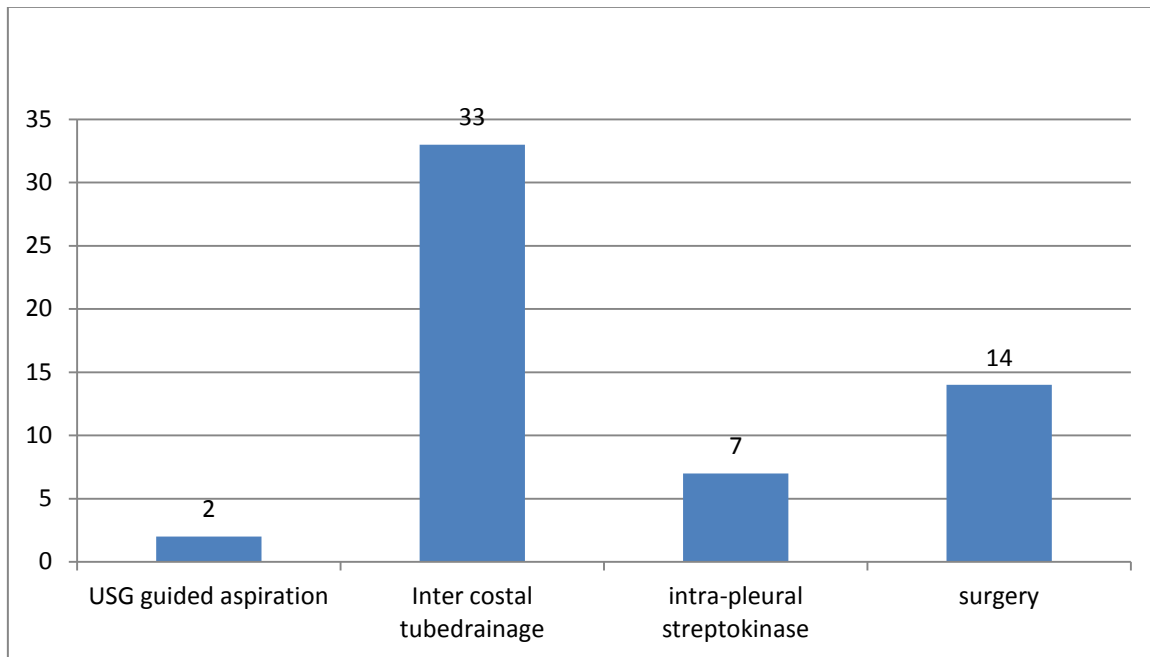
Graph-6

Management: 60 % patients were managed by intercostal tube drainage in present study. Around

25% patients were referred to surgeon for management. (Table-6)(Graph-7)

Table-6 Treatment modalities

Treatment modality	No. of patients	Percentage
USG guided Aspiration	2	3.5
ICTD	33	60
Intra pleural instillation of streptokinase	7	12.5
Surgery	14	25

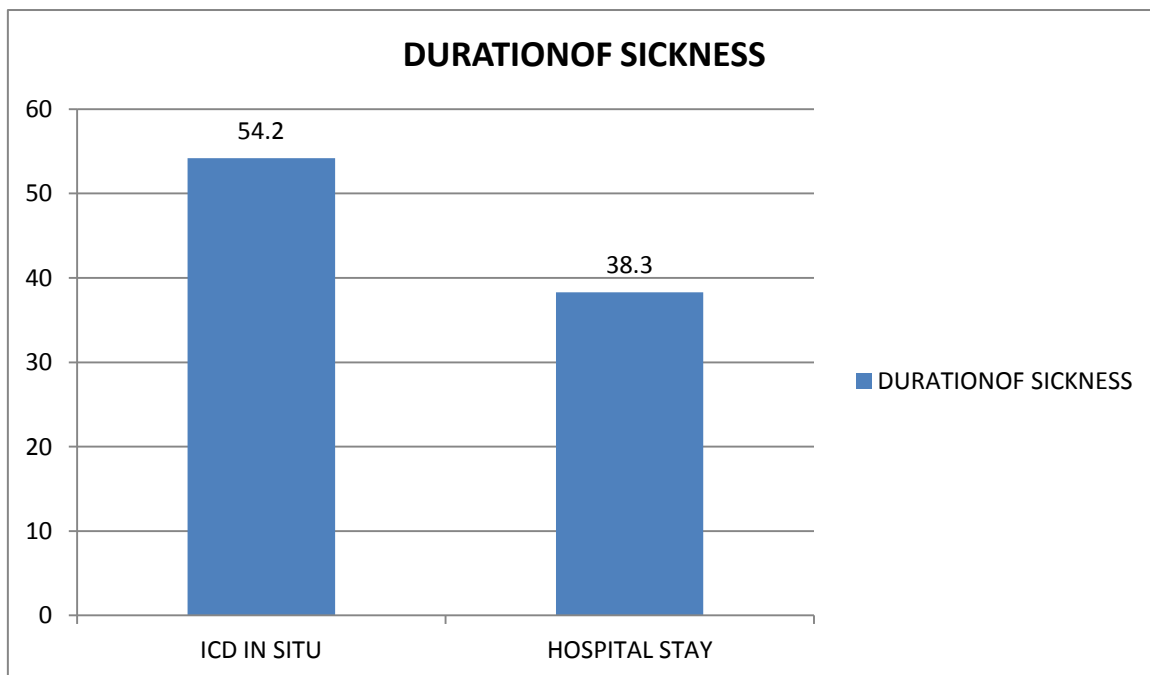


Graph-7

7. Duration of sickness: Duration of hospital stay was 20 to 72 days with mean of 54.2 days in present study. ICD remain in situ for a period of 11to 118 days. . (Table-7)(Graph-8)

Table-7 Duration of sickness

	Average no. of days
ICD in situ	54.2(11-118) days
Duration of hospital stay	38.3 (20-72) days

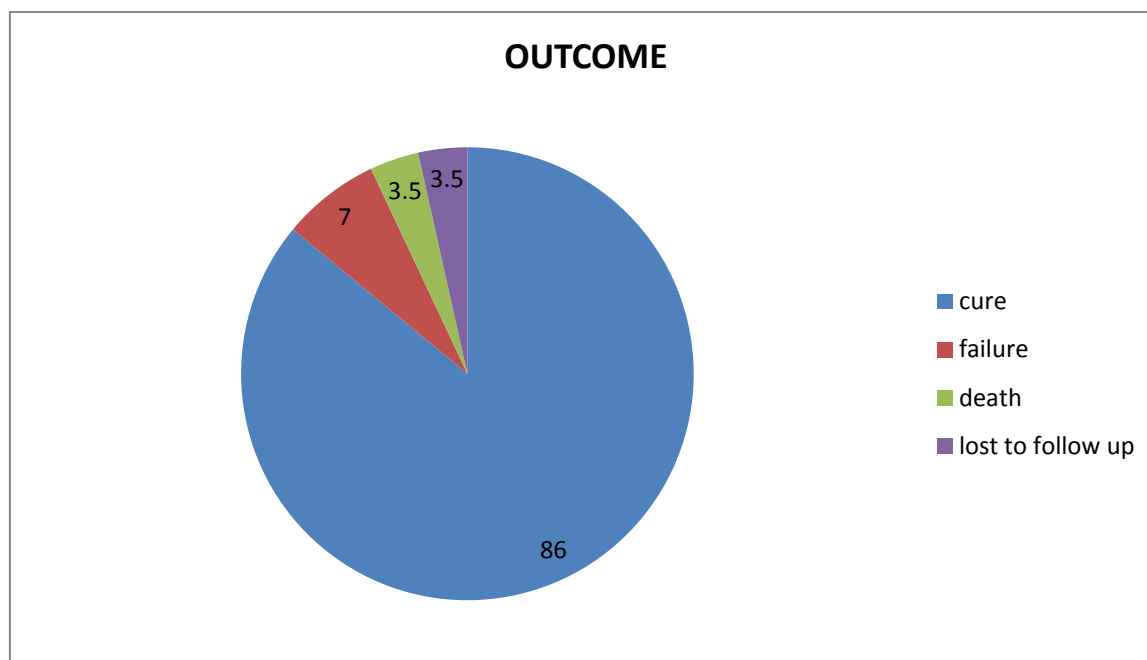


Graph-8

Outcome: At our center favorable outcome was observed in 86% case of empyema thoracic.(Table-8) (Graph-9).

Table-8 Outcome of Empyema thoracic patients after 6 month of discharge

Outcome	No. of patients	Percentage
Cure	48	86
failure	4	7
Death	2	3.5
Lost to follow up	2	3.5



Graph-9

Discussion

Empyemas thoraces continues to be an important cause of morbidity especially in developing countries like India which has been reflected in our study by the number of cases presenting in our OPD (56 over a 12-month period). In western world, causes like community acquired pneumonia, lung abscess and surgical trauma are the commonest causes^(2,10) as compared to India, where, tuberculosis is the most common cause.^(11, 12-16) In our study tubercular empyemas accounts for 42 out of 56 cases i.e.75% of the total empyema cases. The majority of the empyemas lied in the age group 18-40 years and mean age was 33.6 years as supported by Goyal et al⁽¹³⁾, Acharya et al⁽¹⁴⁾, Behra et al and Tondon^(17,18). This finding may be due to because of prevalence of tuberculosis in the same age group.

In the present study, males were more commonly involved in comparison to female patients in the ratio of 2.2:1.0. It can be due to fact that Males in general are more prone to mechanical stresses due to their tall stature and strenuous work and tuberculosis and COPD are more frequent in males. The study done by Kamat reported cough (94%) to be the most common symptom. This was followed by fever (76%), chest pain (75%) and dyspnea (53%)⁽⁹⁾. Malhotra et al also reported the same. In our study most common symptom was breathlessness (33%) followed by chest pain and fever (25%,20%). cough was only observed in 16% of cases .The clinical manifestations of an empyema can vary widely, depending on both the nature of the infecting organism and the competence of the patient's immune system. The spectrum ranges from an almost complete absence of symptoms to a severe illness with systemic

toxicity⁽²¹⁾. In general, anaerobic and tubercular empyemas usually present with a sub-acute illness, whereas aerobic bacterial infections of the pleural space present with an acute illness.⁽¹¹⁾ Regarding the diagnosis of tubercular empyemas, pleural fluid smear for AFB was positive in 9 cases (21.5%), sputum smear was positive in 11 of the patients (26%) in our study. Goyal et al⁽¹³⁾ also reported high pleural fluid smear positivity for AFB. 11cases (26%) had both pleural fluid and sputum smear positivity for acid fast bacilli. Amongst the non-tuberculous empyema cases, pleural fluid culture was positive in 71.4% (10 cases), the most common organism isolated from non-tuberculous cultures was *Staphylococcus aureus* (5, 35%) followed by Gram-negative organisms collectively (2, 14%). Other Indian studies have reported pleural fluid culture positivity of around 42 %^(12,16) with *Staphylococcus* being the commonest one⁽¹⁶⁾. Although *Streptococcus pneumoniae* is a common cause of community-acquired pneumonia, pleural fluid cultures are usually negative, whereas staphylococcal Para pneumonic effusions are more likely to be culture positive.⁽²⁾ In 32% of our case culture was found to be sterile. Anaerobic cultures were also applied in the non-tuberculous 14 cases, amongst which 1 case came out to be culture positive as supported by Malhotra et al⁽¹¹⁾ which also showed low yield of anaerobic organism in pleural fluid aspirates. In the present study the outcome of the patient when compared to the other studies where comparable. In our study cure rate was 86%, failure to improve was in 7% and death was in 3.5% and lost to follow up cases was in 3.5% which comparable to study by Rao et al⁽¹⁹⁾ in which cure was 81% and death in 7%. Another study where they compared tubercular with non-tubercular empyemas by kundu et al⁽²⁰⁾ combined result was cure in 84.5%, failure in 13.5% and death in 3.4% cases. The present study concludes that males of 18-40 age groups are more commonly affected from empyemas thoraces. This disease contributes to be a big burden especially on developing nations

because of its high incidence, marked association with tuberculosis and scanty resources even in tertiary referral centers. Co-morbid conditions like pneumonia, diabetes, alcohol abuse make this condition even more troublesome to treat. Early diagnosis, thorough investigations and early management can help in better outcome of the patients. If the patient does not improve through thoracentesis and/or tube thoracostomy or is recurring then surgery should be planned as it is definitive and life-saving modality.

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