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Clinical and microbiological evaluation of empyema thorasis

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ABSTRACT

Objectives: Comparing the clinical & microbiological profiles of patients with tuberculosis and nontuberculosis empyema**. Materials and Methods:** A prospective study of adult cases of nonsurgical thoracic empyema admitted in a tertiary care hospital in warangal :telangana state was performed over a period of 18 months. A comparative analysis of clinical characteristics, treatment modalities, and outcomes of patients with tuberculosis and nontuberculosis empyema was carried out. **Results:** Fifty cases of empyema were seen during the study period, of which 24 (,48%) were of nontuberculosis etiology while tuberculosis constituted 26(, 52%) cases. Among the nontuberculosis empyema patients, *pseudomonas 8*(16%) was the most frequent pathogen isolated. Tuberculosis empyema was more frequent in younger population compared to nontuberculosis empyema (mean age of 30.6 years vs. 48.5 years). Duration of illness and mean duration of chest tube drainage were longer (40.7 vs. 20.2 days) in patients with tuberculosis empyema. Also the presence of parenchymal lesions and bronchopleural fistula often requiring surgical drainage procedures was more in tuberculosis empyema patients. **Conclusion:** Tuberculosis empyema remains a common cause of empyema thoracis in a country like India. Tuberculosis empyema differs from nontuberculosis empyema in the age profile, clinical presentation, management issues, and has a significantly poorer outcome

Keywords: Empyema, Parapneumonic effusions, Tuberculosis, Pneumothorax, Pyopneumo thorax, Decortication, Intrapleural

Introduction

Ever since the days of Hippocrates Empyema thoracis has been known as pus in the Pleural cavity. Empyema is the most common exudative type of pleural effusion. Empyema is never a primary disease, often it is difficult to arrive at primary focus of Infection, through pleural cavity is the root of pus, the respiratory and cardiovascular System are severely affected. For centuries Empyema thoracis has been recognized as a serious problem. The development of antibiotic resistance has also added to the gravity of the condition. The situation has been made worse by the poor economic state and bad hygienic condition in our country. In developed countries non mycobacterial pulmonary infections and surgical procedures constitute the majority of thoracic empyema cases [1], Staphylococcus and pneumococci are the commonest organisms isolated from the pleural pus. Rest of the isolates includes gram-negative organisms and anaerobes. Gram-negative organisms are frequently isolated, presumably, because of high incidence of resistance of these organisms to commonly used antibiotics in the early phase of empyema. Streptococci were rarely, if ever seen as a cause of empyema. More than one isolate was found in many patients and it is well documented. This justifies the use of combination of antibiotics as an empirical form of treatment. Where as in the developing world tuberculosis accounts for a sizeable number [2] Clinical outcomes of tuberculosis empyema are generally believed to be worse compared to those of non-tuberculosis empyema because of

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protracted illness, presence of concomitant fibrocavitary lung lesions, high bacillary load, development of bronchopleural fistulae (BPF), and requirement for complicated thoracic surgeries in the face of compromised lung function. [3]With this scenario in mind, we decided to conduct this study in our Tertiary care hospital setup to define the clinical course, bacteriological profile, radiological features, various modalities of treatment and their outcome in 50 cases of empyema thoracis. This would guide us to use appropriate antibiotics and management strategies. [4]

Aims and objectives

1. To know the common etiological factors contributing to Empyema
2. To know the predisposing and precipitating factors
3. To know the age, sex, geographical distribution.
4. To know the relation between the early intervention and prognosis.

Materials and methods

Study Design: This study was a prospective analysis of all adult cases of nonsurgical thoracic empyema admitted in the department of respiratory medicine of GOVT CD & TB Hospital Hanamakonda, Telangana State over a period of 2 years between 2013 to 2015.

Patient Selection:

Case Definition:

Thoracic empyema was defined as pleural effusion that fulfilled at least one of the following criteria:

(1) The presence of frank pus on pleural aspiration;
(2) Presence of organism on pleural fluid culture;
(3) Positive pleural fluid Gram stain.

Tuberculosis empyema was defined as cases of thoracic empyema with one of the following:

(1) Pleural fluid smear positive for acid fast bacilli (AFB);
(2) Sputum positive for AFB and having radiological lesions consistent with active parenchymal tuberculosis on chest x-ray/CT scan of the thorax (nodular consolidation with or without cavity in apex, tree in bud appearance).
(3) Probable tuberculous empyema was defined as empyema in patients who had radiological evidence of active pulmonary tuberculosis on chest x-ray/CT scan of the thorax or were sputum positive for AFB.

Sample Size: 50 adult patients with the age group more than 18 years who were admitted with the diagnosis of empyema were included in the study.

Inclusion Criteria:

1) All Adult Patients 18years & above.
2) Clinical features compatible with Empyema.
3) Chest X-ray appearance of Empyema.
4) CT scan of chest with contrast.
5) Loculated Empyema & Non Loculated Empyema
6) Written consent.

Exclusion Criteria:

1) Empyema secondary to penetrating or blunt chest trauma
2) Very Sick Patients.
3) Death in the process of evaluation.
4) Contra Indications to thoracocentesis like uncooperative patients.
5) Withdrawal of consent at any time during study period. [5-9]

Study Protocol: During this study a simplified clinical approach is adopted in patients who were admitted in the inpatient department with symptoms and signs suggestive of Empyema Thoracis. Detailed demographic and clinical parameters including age, sex, symptom duration (fever, weight loss, cough, sputum, hemoptysis, shortness of breath, chest pain) were evaluated in all patients fulfilling the case definition. Presence of anycomorbidities like diabetes mellitus, HIV infection, seizure disorder, liver abscess, rheumatoid arthritis, and malignancy was documented. Complete physical examination was done. Routine investigations which include CBP, TLC, DLC, ESR, RBS, specific investigations like sputum for AFB, Mantoux test was done. Chest radiographs were obtained in all patients at the admission. . In all clinically suspected cases diagnostic thoracocentesis was performed under local anesthesia with 2% xylocaine using sterile disposable syringe (needle size-18 G), which was introduced through 5th intercostal space in mid axillary line or area of maximal dullness, appearance of pus clinches the diagnosis. About 100 ml of pus was drawn in each case and sent for cytology, TLC DLC ADA LDH,glucose, protein,sugar microbiology for gram stain, aerobic culture and sensitivity, AFB stain.[10-12]Those in severe distressunderwent immediate ICD. . Intercostal drainage procedure was done with all aseptic precautions with prior consent taken and inserted in 5th intercostal space in mid axillary line, outer end of the tube was connected to an underwater seal kept in sterile condition.Initially intravenous antibiotics like Amoxicillin-clavulanic acid started in the dose of 2400 mg/day in two divided doses and Amikacin in the dose

of 1000 mg per day in two divided doses, Metronidazole 1500mg per day in three divided doses given. Appropriate antibiotics were added according to culture sensitivity reports. Chest x ray was immediately taken after ICD insertion to confirm the exact position of the tube, as well as to document lung expansion and residual collection subsequently. Daily bedside examination was done to check for vital signs,air entry and the patency of the ICD tube. Whenever blockage was suspected, intercostal tube was readjusted. For those with persistent symptoms and no signs of improvement, ultrasound or CT was done to look for any loculations following tube thoracostomy. All patients were advised on good nutritional intake. Chest physiotherapy was started at the earliest. All of them were encouraged to blow balloons or use incentive spirometry for good lung expansion. ICD was removed when the drainage was less than 50 ml/day with radiological and clinical improvement. Appropriate antibiotics were given for a minimum of 4-6 weeks depending on the clinical condition of the patient and organism isolated. Patients were discharged after confirming good lung expansion and absence of fever. All the patients with persistent clinical symptoms, incomplete lung expansion on ICD and antibiotics, persistent BPF,multiple loculations and thick pleural peel seen on ultrasonography / CT at admission or developed during the course of hospital stay were subjected to surgical line of management. All the patients were advised for follow up at 1 and 3 months. Those who came for follow up were assessed for lung expansion and deformities of the chest wall by clinical examination and chest x-ray if necessary. Ethical clearance was obtained for this study.

Statistical analysis: Statistical analyses were performed using SPSS version 10.0 (SPSS inc., Chicago, IL) software for MS-Windows. Descriptive frequencies were expressed using mean. *P* value was calculated using Fisher's test of significance. Independent sample *t* test for continuous variables, and *P* value <0.05 was considered to be significant. Mean, standard deviation, were also calculated where relevant.[13-15]

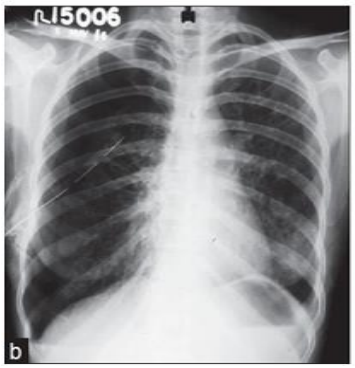

Fig 1: Plain radiograph chest showing right side intercostal drainage tube in situ

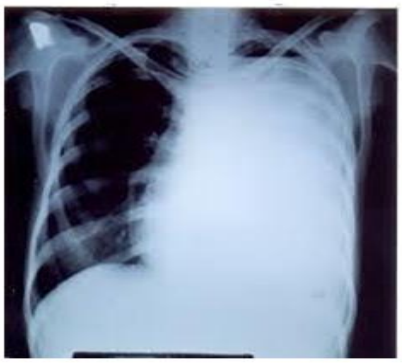

Fig 2: Plain radiograph chest showing Hydropneumothorax on the left side

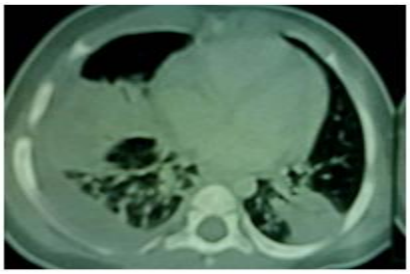

Fig 3:Axial contrast – enhanced CT scan of the chest on the left showing thickening, increased contrast uptake of the parietal pleura with loculated fluid and air in the pleural space

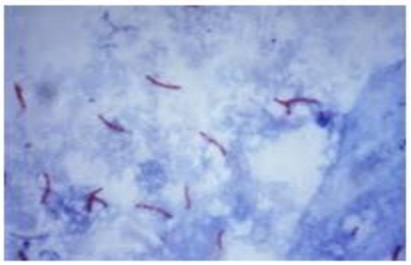

Fig 4:Microscopic image of AFB

Observations and results

Total Cases 50

Table 1: Age Distribution of Empyema

Age	Number of cases	Percentage
18-20	2	4%
21-30	10	20%
31-40	18	36%
41-50	15	30%
>50	5	10%
Total:	**50**	**100%**

In this study majority of cases were in the age group of 31-40 years (4thdecade) Constituting of 18 patients and 36% of the total. This was followed by the 41-50 years Group where there were 15 patients constituting 30% of the total. Put together 31-50years age interval has 66% of the total patients. Youngest patient was 18yr old and the oldest was 75 years old.

Gender Distribution

Table 2: Gender Distribution

Sex	Number of cases	Percentage
Male	46	92%
Female	4	8%
Total:	**50**	**100%**

In this study 92% of patients were male constituting the majority.

Symptoms

Table 3: Showing Symptom Analysis

Major symptom	Number of cases	Percentage
Cough	46	92%
Fever	44	88%
Sob	42	84%
Chest Pain	30	60%
Weight Loss	22	44%

In the present study the commonest presentation of empyema thoracic was Cough (92%), followed by fever (88%), SOB (84%), chest pain (60%) and weight loss (44%).

Duration of Symptoms at the Time of Presentation

Table 4: Duration of Symptoms

Duration of Symptoms	Number of Cases	Percentage
<7 Days	1	2%
7 to 14 Days	14	28%
15 to 30 Days	05	10%
1 Month	30	60%

Mean duration of presentation after the onset of symptoms was 24 days. 30(60%) of the cases presented 1 month after the onset of symptoms. 14 (28%) of the cases presented after 1 week.

Associated Conditions: Alcohol l& tuberculosis were the major associated conditions seen in 44% of patients each ,next most associated condition was smoking (38%), many were current smokers 4(8%) were ex-smokers.HIV, malignancy (NSCLC) seen in one patient each.

Table 5: Showing Associated Conditions

Associated condition	Number of cases	Percentage
Smoking	19	38
DM	4	8
Alcohol	22	44
Tuberculosis	22	44
HIV	1	2
Malignancy	1	2

Diagnosis at Admission

Table 6: Diagnosis at Admission

Diagnosis	Number of patients	Percentage
Right sided empyema	38	76
Left sided empyema	11	22
Bilateral empyema	1	02

Majority patients were having right side empyema 76%, remaining 22 % had left side empyema .only single patient had bilateral empyema.

Etiology

Table 7: Showing the Etiology of Empyema Thoracis

Etiology	Number of cases	Percentage
Tubercular	26	52%
CAP	19	38%
Lung Abcess	03	06%
Post Thoracocentecis (Iatrogenic)	02	04%

The most common etiology was tuberculosis in 26(52%) patients, followed by lung community acquired pneumonia in 19 (38%) and lung abscess in 3(6%). There was 2 case of empyema thoracic caused by Thoracentesis.

Microbiology:

Table 8: Showing the Microbiological Organism Cultured in the Pleural Aspirate

Microbiological Organism	Number(N=50)	Percentage
Gram +ve	**05**	**10**
Staph aureus	04	8
Streptpneumoniae	01	2
Gram -ve	**12**	**24**
Pseudomonas	08	16
Ecoli	02	4
Klebsiella	01	2
Multiple Organisms	01	2
AFB Stain positive	**03**	**6**
Sterile	**30**	**60**

Many cases were sterile 30(60%). Bacteriological isolation was seen in 20(40%)cases. Majority were 12(24%) showing gram negative organisms. Among the gram negative Organisms, pseudomonas 8(16%) were the commonest organism isolated. Followed by E coli 2(4%), Klebsiella 1 (2%).Among the gram positive organisms, staphylococci 4 (8%) and pneumococci 1(2%) were the commonest organisms isolated .one case was showing polymicrobial variety Klebsiella,proteus were seen.AFB stain positive was seen in 3 cases.[16-18]

Radiological Pattern of Empyema

Table 9:Radiological Pattern of Empyema

Radiological Pattern	Number of patients	Percentage
CXR:		
Pleural Effusion	38	76%
Hydro pneumothorax	12	24%
USG/ CT:		
Multi loculated (ML)	08	16%
Non Loculated (NL)	28	56%
ML + hydropneumothorax	06	12%
Not done	08	16%

38 (76%) had pleural effusion on X-ray and 12(24%) cases had Hydro pneumothorax. 8(16%) of the cases had loculated empyema as most of them were in chronic presentation group (fibrinopurulent stage), 28 (56%) had non-loculated and 6 (12%) had hydrpneumothorax with loculations.

Diagnosis of Tubercular Empyema

Table 10:Diagnostic Criteria of Tubercular Empyema

Diagnostic Criteria	Number & Percentage
Sputum positive	18 (69.2%)
Pleural fluid AFB Stain positive	03(11.5%)
Past H/o PTB	18(69.2%)
Mantoux Test	24(92.3%)
CT Showing active infiltrates	10(38.5%)

Of the 26 patients diagnosed as having tubercular empyema, the diagnosis was established bacteriologically, i.e., based on the presence of AFB in sputum and/or empyema fluid in 18 patients (70%). In the remaining 8 cases (30%), this diagnosis was based on clinical grounds, i.e., previous h/o pulmonary tuberculosis, mantoux positivity, radiological appearances consistent with active tuberculosis and response to anti-tuberculous treatment.

Comparison of Tuberculosis& Non-Tuberculosis Cases of Empyema Thoracis: The majority (21 cases, 80.7%) of tuberculosis empyema cases belonged to a relatively younger age group (18–40 years), whereas 66.7% (16 cases) of non tuberculosis empyema patients were above 45 years of age. Mean age in the tuberculosis empyema group was 30.6 years (range: 14–65 years) compared to mean age of 48.5 years (range: 30–72 years) in non tuberculosis group. Twenty-four cases (92%) of tuberculosis empyema had illness of more than cases (25%) of non tuberculosis empyema had duration of more than 1 month and mean duration of illness was significantly higher in tuberculosis group (mean 78.6 days) compared to non tuberculosis group (mean 21.4 days).

Table 11: Clinical Comparison of Tuberculosis &Non-Tuberculosis Cases

	Tuberculosis	SD	Non- Tuberculosis	SD	P-Value
Age (mean)	30.6 yrs	8.45	48.5 yrs	15.4	0.0001
Duration of illness (>1 Month)-Mean	24 (92%)- 70.2 days	11.26	6 (25%)- 20 days	4.8	0.0001
Cough	25 (96%)		21 (87%)		0.4897
Fever	20 (77 %)		24 (100%)		0.023
SOB	18 (70%)		24 (100%)		0.49
Hemoptysis	08 (30.7 %)		1 (4%)		0.0244
BMI <18.5	14 (53.8%)		5 (20.8%)		0.0215
Past H/o PTB	18 (69.2%)		04 (16%)		0.0001
H/o Contact with PTB	21 (80.7%)		07 (29%)		0.0005
TLC (Blood)	10,200.4cumm	1153.7	14,841.2cumm	1327.6	<0.0001
ESR 1st Hour	48	6.8	51	11.2	0.2538
Mantoux	24 (92.3%)		7 (29%)		0.0001

There was not much difference in routine laboratory markers between the two groups, mean TLC was 10200.4/cumm, and mean ESR was 48 mm at the end of first hour in the tuberculosis group, corresponding values in the non tuberculosis group were 14,841.2/cumm and 51 mm, respectively. All non tuberculosis empyema patients had fever, which was also present in 77% of tuberculosis empyema patients.Hemoptysis was more common in tuberculosis compared to non tuberculosis empyema (8 cases, 30.7% vs. 1 case, 4%).Many tubercular patients 14(53.8%) were had BMI<18.5, only 5 cases (20.8%) of non-tubercular patients were belonged to this group. past h/o PTB was significant in tubercular cases 69.2% (18 cases) many were defaulters 61.5% (16 cases) were CAT1 defaulters, 2 cases were CAT2 defaulters. Only 4(16%) were had h/o PTB in non-tubercular cases.

Table12:Comparison of Associated Conditions

Co Morbidity	Tuberculous	Non-Tuberculous
DM	1(3.8%)	3(12.5%)
HIV	1(3.8%)	0
COPD	7 (26.9%)	12 (50%)
Alcoholism	8 (30.8%)	14 (58%)
Malignancy	0	1(4%)

Alcoholism was the commonest co morbid condition seen in 22 (44%) of total cases. In that 8 cases (30.8%) were tubercular, 14 (58%) cases were non tubercular. COPD was seen in50% (12 cases) of non-tubercular, 27%(7 cases)of tubercular empyema. Other co morbid conditions were DM, HIV, NSSLC.

Table13: Comparison of Pleural Fluid Analysis in Tuberculous, Non-Tuberculous Cases of Empyema

Pleural Fluid Analysis	Tuberculous (Mean)	SD	Non-Tuberculous (Mean)	SD	P-Value
Protein gm/dl	3.4	0.8	5.2	1.2	<0.0001
Sugar mg/dl	52.2	4.6	40.4	6.7	<0.0001
TLC/mm^3	1026.6	204.8	1500.2	236.8	<0.0001
ADA	58.6	14.6	276	32.7	<0.001
LDH	1536.7	123.8	6030.2	342.4	<0.001

Tubercular empyema patients had glucose mean value 52.2 mg/dl, protein 3.4mg/dl while glucose mean was

40.4 mg/dl in non-tubercular cases, protein mean was 3.4gm/dl.TLC average was 1026.6,1500.2 in tubercular and non-tubercular cases. Both were PMN predominant. ADA mean was 58.6, LDH mean1536.7 in tubercular, 276, 6030.2 respectively in non-tubercular.

Table 14: Comparison of Treatment &Outcome

Treatment & Outcome	Tuberculous	SD	Non-Tuberculous	SD	P-Value
Duration of Hospitalization	48.4 days	12.4	20.2 days	9.8	0.0001
Duration of ICD Tube	40.7 days	7.3	18. 6 days	5.1	0.001
BPF	17 (65.3%)		5 (20.8%)		0.002
Resolution	14(53.8%)		23 (95.8%)		0.0009

The drainage modalities in non-tuberculous empyema were intercostal tube drainage in 18 cases (75%), and serial aspirations in 8 cases (33.3%). ICD was done in all tubercular empyema cases. The treatment default cases were put on category II DOTS. Seventeen patients (65.4%) in the tuberculous empyema group required ICTD for more than 1 month compared to only 6(25%) in the non-tuberculous group; mean duration of intercostal tube drainage was also higher in the tubercular group (40.7 days) as against the non-tubercular group (20.2 days). BPF was seen in 17 (65.3) cases of tubercular, 5(20.8%) of non-tubercular empyema. Good lung expansion with minimal pleural thickening seen in 23 cases (95.8%) of non-tubercular cases. But only 14 (53.3%) cases of tubercular empyema had resolution. Twelve patients (46.6%) with tuberculous empyema required surgery despite ATT and ICTD, whereas only one (4%) in the non-tuberculous group needed surgery

Discussion

Age Incidence: The high incidence of empyema in the productive age group of 21-40 years in this study (56%) is consistent with the findings in the earlier studies by Acharya *et al*, S Kundu, Behra and Tandon [19-21](58%). This may be due to the common occurrence of pulmonary tuberculosis particularly in the developing countries with a high prevalence of tuberculosis. Two other studies show the incidence of empyema to be higher after the age of 40. This may be attributed to the fact that the above studies were carried out in the developed countries, where the prevalence of tuberculosis is relatively low; in contrast to the present study, which was undertaken in India.

Sex Incidence: In the present study, males outnumbered female patients (46 vs 4). Males in general are more prone to mechanical stresses due to their tall stature and strenuous work. Smoking is a more frequent habit, and tuberculosis and COPD are more frequent in males. Hence the disease seems to be more common in male gender and the results of these studies are all comparable to that of the present study.

Symptoms: 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%). In the present study the commonest presentation of empyema thoracic was cough (92%), followed by fever (88%), SOB (84%) chest pain (60%), and weight loss (44%).The clinical manifestations of empyema can vary of widely depending on both the nature of the infecting organism and the system. The spectrum ranges from an almost complete absence of symptoms to a severe illness with systemic toxicity. In general, anaerobic and tubercular empyema usually present with a sub-acute illness, whereas aerobic bacterial infections present with an acute illness.[22-23]

Laterality of Empyema: Empyema occurred more frequently on the right side 38(76%) than the left 11(22%). Bilateral empyemas was seen in 1(2%) the present study. It is evident from the present study (76%) that the disease was more common on right side. In R.K.Tandon *et al*, it was 57.14%. This is probably due to the greater bulk of the right lung .Bilateral payothorax is quite an infrequent occurrence in all the series. In a study by Glena Cheng and Jamie RE Vintch, "A retrospective analysis of the management of para pneumonic empyemas in a country teaching facility from 1992 to 2004"also alcohol abuse and tobacco abuse were among the common social co morbidities of the 72% empyema patients, which is comparable to the present study (82%).

Etiology: In the present study, infectious etiology is more common because this study was carried out in a TB and chest diseases ward and patients of posttraumatic and postsurgical empyema were excluded from the study. The most common etiology was tuberculosis in 26(52%) patients, followed by community acquired pneumonia in 19 (38%) and lung abscess in 3(6%).

Microbiology: Prior to the availability of antibiotics, streptococcus pneumoniae and streptococcus pyogenes accounted for most empyemas. After the discovery and widespread use of penicillin in the 1940s, staphylococcus aureus succeeded *S. pneumoniae* and *S.pyogenes*as the major cause of empyema-lactamase.resistant. Since the semi synthetic penicillins in the early 1960s, the incidence of staphylococcal empyema has decreased, and infections due to anaerobic bacteria (Bacteroides,Peptostreptococci and Fusobacteria) and aerobic gram-negative bacilli (*E. coli,* Pseudomonas, Proteus, Klebsiella) have increased markedly. Approximately 75% of patients with empyema have multiple infecting organisms averaging three bacterial

species per patient. The pathogen isolated also depends on presence or Predisposing factors like community-acquired pneumonia (*S. pneumoniae*), h/o aspiration (anaerobes), sub diaphragmatic infections (aerobic gram-negative enteric bacilli), external trauma and hemothorax (*Staphylococcus aureus*) and immunosuppression (*Staphyhlococcusaureus*, *Mycobacteria).*In the present study many cases were sterile 30(60%). Bacteriological isolation was seen in 20 (40%) cases. Majority were 12(24%) showing gram negative organisms. Among the gram negative Organisms, pseudomonas 8(16%) were the commonest organism isolated. Followed by E coli 2(4%), Klebsiella 1(2%) This is in concurrence with the reports of various workers who have emphasized the emergence of gram-negative bacilli as predominant. This negative culture report in present series was related with good number of tuberculouspyopneumothorax. Mycobacteria tuberculosis organisms do not grow on ordinary media. Special media like Twin 90 and Dorset egg media will take six weeks to grow.

Radiology: If one goes through the investigations in a case of empyema thoracic, it is uncommon to find a big pile of X-rays, sometimes the number of x-rays equal the number of days of hospital stay. The amount of radiation exposure in these patients is a matter of concern. In the present study X-ray postero-anterior and lateral view was done at the time of admission, next X-ray was taken to know the tube position and the degree of lung expansion. Subsequently the patients were subjected to X-ray chest every 5 days to confirm the clinical findings, till the ICD was removed and finally before the discharge. Ultra sonography / CT was done in 42(84%) of the cases at the time of admission, 8(16%) had multiple loculations, 24(56%) were non-loculated, 6(12%) had pyo-pneumothorax with loculations. All HPTs at the time of diagnosis were tubercular cases. A study done by Kearney SE *et al* [**24]** (1999) reported 7/36 (19%) pleural collections were anechoic or non-loculated, 5/36 (14%) were hyperechoic without septae and 24/36 (67%) were hyperechoic with septae/ multiple loculi.The appearances of empyema on ultrasound probably represent different stages of the disease process. Anechoic or hypo-echoic, non-septated fluid precedes hyperechoic fluid and later on Septations or loculations develop. This may correlate with progression of empyema from the exudative to fibrinopurulent stage when increasing fibrin deposition causes formation of Septations and loculations in the pleural fluid and a rind or peel on the pleural surface. Septations, loculations and thickness of the pleural rind are easy to assess on ultrasound.

Pleural Fluid Analysis: Grossly purulent fluid was seen in 45/50(87.5%) of the cases and 5/50(10%) had seropurulent effusion.

Glucose &Protein: Tubercular empyema patients had glucose mean value 52.2 mg/dl, protein 3.4mg/dl while glucose mean was 40.4 mg/dl in non-tubercular cases; protein mean was 3.4gm/dl.

Cell Count: TLC average was 1026.6, 1500.2 in tubercular and non-tubercular cases respectively. Both were PMN predominant.

[25-29]

Table 15: Comparison of Tuberculosis & Non-Tuberculosis Cases of Empyema Thoracis

Clinical Character	S Kundu *et al* study		Present Study	
	Tubercular	**Non-Tubercular**	**Tubercular**	**Non-Tubercular**
Age (mean)	32.7	46.5 yrs	30.6 yrs	48.5 yrs
Duration of illness >1 Month	82.8%	28.3%	92%	29%
Cough	82.8%	83.6%	84.6%	75%
Fever	73.5%	100%	77 %	100%
SOB	93.1%	100%	92.3%	100%
Hemoptysis	24.3%	6.5%	30.7 %	4%
BPF	48.8%	10.9%	64.5%	20.8%

These results were comparable to those obtained in the present study. According to S Kundu *et al* and present study majority of tuberculous empyema cases belonged to a relatively younger age group (18–40 years), non-tuberculous empyema patients were above 45 years of age. Majority cases of tuberculous empyema had it whereas only few cases (<29%) of non tuberculous empyema had duration of more than 1 month and mean duration of illness was significantly higher in tuberculous group compared to non tuberculous group.Hemoptysis & BPF was more common in tuberculous compared to non tuberculous empyema.

Treatment &Outcome

Despite being recognized since the ancient times, the appropriate management of empyema thoracis remains controversial. It may be postulated that the most

appropriate therapy depends on the stage of the disease at presentation.The literature provides many options including antibiotics alone or combination in with repeated thoracentesis, closed intercostal tube drainage, fibrinolytic agents like streptokinase or deoxyribonuclease, video-assisted thoracoscopy, thoracotomy and decortications**.** However, the treatment objectives outlined by MAYO[29] are:

- To save life
- To eliminate the empyema,
- To re-expand the trapped lung,
- To restore mobility to the chest wall and diaphragm,
- To return the respiratory function to normal,
- To eliminate complications or chronicity, and
- To reduce the duration of hospital stay

In the present study, 42/50(84%) were managed with ICD and antibiotics. Amount ofpus drained was 1500-4000ml. 90% of the pleural drain occurred on the first 3 days. Minimum duration for lung expansion was seven days and maximum of 45 days. The time taken for fever to subside ranged from 4-10 days.Seventeen patients (65.4%) in the tuberculous empyema group required ICTD for more than 1 month compared to only 6(25%) in the non-tuberculous group; mean duration of intercostal tube drainage was also higher in the tubercular group (40.7 days) as against the non-tubercular group (20.2 days). BPF was seen in 17 (65.3) cases of tubercular, 5 (20.8%)of non-tubercular empyema.There is no practice of using intrapleuralfibrinolytic in our hospital setting and the other reason being cost constraints. Good lung expansion with minimal pleuralthickening seen in 23 cases (95.8%) of non-tubercular cases. But only 14 (53.3%) cases of tubercular empyema had resolution. Twelve patients (46.6%) with tuberculous empyema required surgery despite ATDs and ICTD, whereas only one (4%) in thenon-tuberculous group needed surgery.

Follow-up: All patients were followed up after the discharge at 1 and 3 months. All of them were evaluated clinically and radiographically. Most of the patients 74% were asymptomatic and had good lung expansion. 8% were clinically normal but revealed pleural thickening.8 % had persistent collapse.

Conclusion

Empyema continues to be prevalent in our country particularly in the lower socioeconomic strata due to the delay in seeking medical care, inappropriate antibiotics and dosages and duration of antibiotic treatment.

- Empyema fluid is diagnostic for pathogens if appropriate handling and early cultures but in the present scenario with prior antibiotic treatment, the fluid is sterile most of the times. Pleural fluid biochemical parameters would also vary depending on the stage of empyema, severity and previous antibiotic therapy.
- Tuberculous empyema remains a common cause of empyema thoracis in our country India. Tuberculous empyema differs from non-tuberculous empyema in the age profile, Clinical presentation, management issues, and has a significantly poorer outcome.
- Ultrasonography is non-invasive, gives no radiation, is easily available and is an ideal investigation for staging, detecting loculations and planning the treatment. CT thorax is preferred in complicated empyemas.
- Management of primary empyema continues to be controversial in terms of duration of antibiotic therapy and the indications for and timing of surgery. There is a need for randomized controlled trials for strict guidelines on the management of empyema.

Summary

- This was a prospective study of empyema thorasis in adults done in Govt. TB&Chest Hospital Hanamkonda. 50 cases of were evaluated for the clinical course of the disease and bacteriological profile.
- Most affected patients were in the age group of 3 1 -50 years (66%), Males outnumbered females, with a male to female ratio of 11.
- The most common etiology was tuberculosis in 26(52%) patients, followed by community acquired pneumonia in 19 (38%) and lung abscess in 3(6%).
- Many cases were sterile 30(60%). Bacteriological isolation was seen in 20 (40%) cases.
- Majority were 12(24%) showing gram negative organisms. Among the gram negative Organisms, pseudomonas 8(16%) were the commonest organism isolated. Followed by E coli 2(4%), Klebsiella 1(2%).Among the gram positive organisms, staphylococci 4 (8%) and pneumococci 1(2%) were the commonest organisms isolated .one case was showing polymicrobial variety.
- Pus for AFB stain was seen in 3 cases, all were sputum positive.
- 38 (76%) had pleural effusion on X-ray and 12(24%) cases had Hydropneumothorax. All HPTs at the time of diagnosis were tubercular cases.
- 8(16%) of the cases had loculated empyema as most of them were in chronic presentation group (fibrinopurulent stage), 28 (56%) had non-loculated and 6 (12%) had pyopneumothorax with loculations.
- The majority (21 cases, 80.7%) of tuberculous empyema cases belonged to a relatively younger

age group (18–40 years), whereas 66.7% (16 cases) of non tuberculous empyema patients were above 45 years of age.

- Mean duration of illness was significantly higher in tuberculous group (mean 78.6 days) compared to non tuberculous group (mean 21.4 days).
- Many tubercular patients 14(53.8%) were had BMI<18.5, only 5 cases (20.8%) of non-tubercular patients were belonged to this group. past h/o PTB was significant in tubercular cases 73% (19 cases) many were defaulters.
- Tubercular empyema patients had pleural fluid glucose mean value 52.2 mg/dl, protein 3.4mg/dl while glucose mean was 40.4 mg/dl in non-tubercular cases, protein mean was 3.4gm/dl;both empyema cases were PMN predominant.ADA mean was 58.6, LDH mean1536.7 in tubercular 276, 6030.2 respectively in non-tubercular.
- Mean duration of intercostal tube drainage was also higher in the tubercular group (40.7 days) as against the non-tubercular group (20.2 days). BPF was seen in 17 (65.3) cases of tubercular, 5 (20.8%) of non-tubercular empyema.
- Good lung expansion with minimal pleural thickening seen in 23 cases (95.8%) of non-tubercular cases. But only 14 (53.3%) cases of tubercular empyema had resolution. All 6 (12%) loculated HPTs were tubercular and showed persistent BPF required surgery twelve patients (46.6%) with tuberculous empyema required surgery despite ATT and ICTD, whereas only one (4%) in the non-tuberculous group needed surgery.

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