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# Tuberculous Empyema Thoracis: Clinical Profile, Diagnostic Tools and Management Outcome

Medicine

**KEYWORDS:** Tuberculous empyema, non-tuberculous empyema, Medical Thoracoscopy.

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## ABSTRACT

Thoracic empyema is a disease of significant morbidity and mortality. We performed a prospective study over a one year period with the aim of diagnosing Tuberculous Empyema. Medical Thoracoscopy was done in all patients to make definite diagnosis. 32 patients of empyema were seen during the study period, of which 22 (68.7%) were of nontuberculous etiology while tuberculous Empyema constituted 10 (31.2 %) cases. Tuberculous empyema was more frequent in younger population compared to nontuberculous empyema. Mean duration of chest tube drainage was longer in patients with Tuberculous Empyema. 12 patients required surgery (5 Tubercular) and 1 patient of Tuberculous Empyema died. Diagnosing Tuberculous Empyema is difficult often requiring invasive procedures. Tuberculous empyema differs from nontuberculous empyema in the age profile, clinical presentation, management issues and has a significantly poorer outcome.

**Introduction**

Thoracic empyema remains a common problem with significant morbidity and mortality. In developed countries nonmycobacterial pulmonary infections and surgical procedures constitute the majority of thoracic empyema cases,[1] whereas in the developing world tuberculosis accounts for a sizeable number[2].

Only 20% of the patients may have a parenchymal infiltrate due to TB on chest radiograph [3]. Cultures may be negative in tuberculous empyema. ADA levels tend to be higher in empyema [4]. So the diagnosis of Tuberculous Empyema with pleural fluid analysis is often difficult and we are likely to miss the diagnosis.

Medical thoracoscopy allows direct visual assessment of the pleura and subsequent biopsy of visually abnormal areas, hence maximizing diagnostic yield[5]. We performed a prospective study over a one year period with the aim of diagnosing Tuberculous Empyema. Also to compare the clinical profiles and outcomes of patients with tuberculous and nontuberculous empyema.

**Material and methods**

**Study design:** The present study was conducted from May 2015 and April 2016 in Kamla Nehru Chest Hospital, Dept of Pulmonary Medicine, Dr S N Medical College, Jodhpur, Rajasthan. This study was a cross sectional, prospective type of study. Detailed demographic and clinical parameters were evaluated in all patients fulfilling the inclusion criteria. Chest radiographs were obtained in all patients while ultrasound (USG) and computed tomography (CT) were carried out when deemed necessary by the treating physician. Pleural fluid was collected under strict asepsis by thoracentesis and total leukocyte count (TLC), differential leukocyte count (DLC); protein, sugar; gram stain and culture sensitivity were performed in all patients. Mycobacterial smear was also sent.

Data was entered using Microsoft Excel 2007 and analyzed using Software SPSS 24th Version. Statistical analysis was done by using Chi square test and P Value <0.05 as significant.

**Inclusion criteria:** Pleural effusions that fulfilled at least one of the following

(i)Frank pus or purulent appearing fluid,
(ii) Positive pleural fluid culture,
(iii) Positive pleural fluid gram stain.

Written informed consent was taken from all patients and the study was cleared by the Institute's ethics committee.

**Exclusion criteria:**

(i) Empyema secondary to trauma chest, any procedure
(ii) Tuberculous empyema: If pleural fluid smear and/or Gene Expert was positive for acid-fact bacilli (AFB)/Mycobacterium tuberculosis.
(iii) Positive sputum smears for AFB.
(iv) Any Contraindications for Thoracoscopy. Age less than 15 years.

**Instrument:** Olympus (LTF-160) semi-rigid thoracoscope.

**Procedure**

After informed consent, explaining the procedure and probable complications during and after procedure, thoracoscopy was performed under conscious sedation. All patients received antibiotic therapy. Antibiotics were changed if culture revealed a resistant organism or empirically if there was no clinical response. Anti tubercular drugs were started if Thoracoscopic findings were suggestive of Tuberculosis or if biopsy proven. Poor outcomes were defined as duration of pleural drainage greater than 30 days, need for surgery, and/or death.

**Results**

Out of 32 patients of empyema, 22 (68.7%) were of non tuberculous etiology and 10 (31.2 %) were of tuberculous etiology. Comparison of clinical and demographic characteristics of patients with tuberculous vs. non-tuberculous Empyema is shown in Table 1. There was not much difference in routine laboratory markers between the two groups, mean TLC was 10027.6/cmm, in the tuberculous group and in the nontuberculous group were 14877.1/cmm. The most common symptoms were fever (94%), dyspnea (81%), cough (56%) and chest pain (50%). Addiction (smoking and alcoholism) has no statistical correlation.

There was not much difference in Plural fluid analysis between two groups (Table 2). ADA level has no statistical correlation in diagnosingTuberculous Empyema (p value = 0.1062).

Most common Thoracoscopic finding in tuberculous empyema was whitish patches/slough with or without adhesions (8 patients) and sago grain appearance in 2 patients. In Non Tubercular Empyema all patients had whitish patches with or without adhesions on Thoracoscopy. Most common complication in thoracoscopy was bleeding which was controlled by local measures.

There 6 Patients (60 %) had BPF in the tuberculous empyema group compared to 5 cases (22.7 %) in the nontuberculous empyema group. Mean duration of chest tube drainage was longer in patients with Tuberculous Empyema (45.4 days) compared to Non Tuberculous Empyema (16 days). 12 patients were referred to higher center for surgical interventions (5 were tuberculous empyema). Unfortunately one patient of tuberculous empyema died.

**Table 1: Comparison of clinical and demographic characteristics**

| | | Tuberculous Empyema (N=10) | Non-tuberculous Empyema ( N= 22) |
|---|---|---|---|
| Age in years (mean) | | 30.60 | 44.36 |
| Age Distribution | ≤20 YEARS | 1 | 3 |
| | 21 TO 40 YEARS | 8 | 4 |
| | 41 TO 60 YEARS | 1 | 12 |
| | >60 YEARS | 0 | 3 |
| Sex | Male | 8 | 15 |
| | Female | 2 | 7 |
| Duration of symptoms (mean, days) | | 43 | 16 |
| Occupation | Farmers | 2 | 1 |
| | Stone Cutter | 3 | 6 |
| | House Wife | 2 | 8 |
| | Others | 3 | 7 |
| Co Morbidity | Diabetes mellitus | 0 | 5 |
| | COPD | 0 | 2 |
| | Renal Diseases | 1 | 0 |
| | Liver Diseaese | 0 | 1 |
| Total Duration Of Illness | ≤1m | 0 | 15 |
| | > 1month | 10 | 7 |

**Table 2: PLEURAL FLUID ANALYSIS**

| Pleural fluid features | | EMPYEMA | |
|---|---|---|---|
| | | Tuberculous | Non Tuberculous |
| Side of Effusion | Right (71.8%) | 7 | 16 |
| | Left (28.1%) | 3 | 6 |
| pH (Mean±2 S.D) | | 7.180 ±0.09189 | 7.132±0.09946 |
| Protein (Mean±2 S.D) (g/dl) | | 5.310 ± 0.6280 | 5.436 ± 0.7613 |
| Glucose (Mean±2 S.D) (mg/dl) | | 44.600 ± 12.4918 | 37.955 ± 7.9191 |
| Neutrophils(Mean±2 S.D) (%) | | 80.600 ± 8.8719 | 79.682 ± 9.3523 |
| Lympocytes(Mean±2 S.D) (%) | | 20.000 ± 9.2616 | 20.318 ± 9.3523 |
| ADA | Mean±2 S.D | 77.600 ± 26.8129 | 56.500 ± 22.3772 |
| | <40 | 0 | 5 |
| | ≥40 | 10 | 17 |

**Discussion**

Pulmonary infections including community-acquired pneumonia, aspiration pneumonia as well as suppurative lung diseases like bronchiectasis, lung abscess and Surgical trauma are the commonest causes of thoracic Empyema in the West.[6-8] But most studies from India reveal that tuberculosis accounts for a large number of empyema with figures ranging from 29% to 85.1% of all cases[9,10]. Tuberculosis now ranks second to bacterial pneumonia as a cause for empyema[10,11].

We found that Tuberculous Empyema most often afflicts young male patients[10,13]. This is primarily due to the high incidence of pulmonary tuberculosis in this age group. Not surprisingly, duration of symptoms was significantly greater in patients with tuberculous empyema. Tuberculous empyema is typically chronic as compared to pyogenic causes. Most patients with PTB are chronically ill and the supervention of pleural involvement often is clinically silent. This prolonged asymptomatic course may be explained by the formation of a thick pleural rind that virtually isolates the tubercle bacilli to the pleural space.[14]

Though it is often expected that tuberculous empyema should be teeming with mycobacteria, this may not be the case in clinical practice as M. tuberculosis is an aerobic bacterium and the acidic and anaerobic pleural environment of patients with empyema may hinder its growth thus resulting in positive smears but negative cultures .[11] Measurement of pleural fluid adenosine deaminase (ADA) is diagnostically useful in differentiating tuberculous effusions from other causes of exudative effusions. Unfortunately it is of less value in empyema as levels tend to be high in empyema of any infectious aetiology.[12] This was the case in our study as well, with no statistically significant difference in values between tuberculous and non-tuberculous aetiologies of empyema.

Mean duration of chest tube drainage was longer in patients with Tuberculous Empyema (45.4 days) compared to Non Tuberculous Empyema (16 days). 6 Patients had BPF in the tuberculous empyema group compared to 5 cases (22.7 %) in the non tuberculous empyema group.12 patients was referred to higher center for surgical interventions (5 were tuberculous empyema). Unfortunately one patient of tuberculous empyema died. The mortality in patients with tuberculous empyema reported in the present study 1/10 (10%) is comparable to that seen in other studies[10,13].

Tuberculous empyema remains a major problem in developing countries despite the availability of potent anti-tubercular drugs and improved surgical techniques. The invariable presence of concomitant fibrocavitary parenchymal disease, high bacillary load, frequent development of bronchopleural fistulae and poor general condition of patients combine to ensure significant morbidity and mortality for this disease and had a poorer outcome[13].

**Conclusion:** To conclude, tuberculosis is an important cause of empyema in the young population of our country. Diagnosis of tuberculous empyema is clinically challenging with fluid analysis alone. Medical thoracoscopy being a very simple and safe procedure for diagnosing Tuberculous empyema. Tuberculous empyema patients have a protracted duration of illness, a significant incidence of BPF necessitating complicated drainage including surgical drainage and a relatively poor outcome compared to patients with nontuberculous empyema. Hence an early diagnosis is imperative.

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