

EMPYEMA THORACIS IN CHILDREN: OUR EXPERIENCE IN A TERTIARY CARE CENTRE IN ASSAMC. H. Deepak Singh¹, Rajib Ray Baruah²**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: Empyema has been described since ancient time and incidence is increasing worldwide and has substantial morbidity and mortality. We evaluated the clinical, surgical and microbiological features, management outcomes of empyema. **METHODS:** A retrospective observational study over 5 years (2010 to 2014) was carried out at Gauhati Medical College and Hospital, Guwahati, India. **RESULTS:** Patients (n=133) were predominantly male and ratio of male to female is 1.7: 1. Main clinical presentation was fever with cough. The infective organism was Staph aureus in majority. Tube thoracostomy was done in 133 and decortication in 23. Two underwent VATS. Mean hospital stay was 12 days for tube thoracostomy and 24 days for thoracotomy procedures. **CONCLUSION:** Empyema remains an important cause of morbidity and hospital admissions. Multiple therapeutic options exist for the treatment of empyema thoracis.

KEYWORDS: Empyema thoracis, Tube thoracostomy, Thoracotomy, VATS.

INTRODUCTION: Empyema thoracis had been described since ancient time as reported by Hippocrates, Paul of aegina, fabricus and was a known complication that followed pulmonary infections and required external drainage for cure.¹ Empyema thoracis is an accumulation of purulent fluid in the pleural cavity. It commonly occurs as a sequelae of bacterial pneumonia, may also occur after trauma, intrathoracic esophageal perforations, or surgeries of the chest.

There exist differences between adult and pediatric pleural infections. Firstly, it is rare for children to have an underlying lung disease, so the final outcome is almost always excellent. Secondly mortality is rare in children (In adult upto 20%).

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The pathologic manifestation of empyema thoracis is a dynamic condition. The American Thoracic Society has described three stages of empyema namely exudative, fibrinopurulent and organized. The exudative phase (1-3days) is caused by increased permeability of the inflamed pleura. The fibrinopurulent phase (4-14 days) is characterized by accelerated fibrin deposit, becomes purulent leading to empyema and loculations and the organizing stage (after 14 days) is characterized by thickened pleura, producing an inelastic membrane "the peel", which restricts lung movement termed as trapped lung.²

Staphylococcus aureus is the most common cause in the developing world, while the Streptococcus pneumoniae in the developed world. The reported rates of identifying an infectious cause from pleural fluid vary between 8% and 76% respectively. Pleural fluid is sterile due to widespread early use of antibiotics. Other causes are Streptococcus pyogenes, Haemophilus influenza, Mycobacterium species, Escherichia coli etc.³

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The management of empyema thoracis involves three core principles: prompt initiation of appropriate antibiotics, the complete evacuation of suppurative pleural fluid and the preservation or restoration of lung expansion.⁴

PATIENTS AND METHODS: This study was a retrospective analysis of all cases of empyema thoracis admitted to the Pediatric Surgery ward or referred from other departments of Gauhati Medical College & Hospital, Guwahati Assam from January 2010 to December 2014. 133 patients below 12 years of age, diagnosed on the basis of history, examination and investigations, including chest X-ray. Ultrasonography (USG) and computed tomography (CT) were done in selected cases only. All cases having empyema thoracis (Pus on aspiration from the pleural cavity) were included. Patients diagnosed to be having concurrent and severe underlying lung disease were excluded. Written informed consent was taken and the respective procedures were well-explained to patient's parents or guardians. The demographic characteristics of patients were noted.

All patients underwent closed intercostal chest tube drainage with 16-24 Fr. Under strict aseptic precaution chest tube was inserted under local anesthesia in minor operating room.⁵ Chest tubes were usually put by residents under the guidance of consultants. As a routine, empirical intravenous antibiotics and supportive treatment mainly maintenance of hydration, oxygenation, nutrition, blood transfusion and nursing care were given to all patients.

The chest tube was removed after clinical improvement, that is when no or below 30ml drain output was documented for more than 24 hrs. and the radiological lung re-expansion. Antibiotics were changed based on culture and sensitivity reports.

Decortication was subjected for patients who did not recovered after tube thoracostomy, thick peel encasing collapsed lung, multiple septations.⁶ the procedure was conducted by the consultants.

The thick peel was carefully removed from the surface of the entire lung releasing encased lung through posterolateral thoracotomy. All significant air leaks were closed and necrotic lung tissue if found were debrided. A chest tube was connected to the water sealed chest tube drainage bag. Two patients underwent VATS procedure. It was done with three trochar sites and positioned according to the site and extent of the pathology.

Descriptive statistics were used to calculate mean, median and standard deviation for variable such as lung re-expansion and hospital stay. Frequency was used to calculate bacteriological profile, sex, symptoms etc.

RESULTS AND OBSERVATIONS: Total numbers of patients with the diagnosis of empyema thoracis admitted or referred in the department of Pediatric Surgery, Gauhati Medical College & Hospital between January 2010 and December 2014 was 133 children.

AGE	NO. OF CASES	PERCENTAGE
0 DAYS - 1 YEAR	20	15.03
1.1 YEARS - 3 YEARS	39	29.32
3.1 YEARS - 6 YEARS	39	29.32
6.1 YEARS - 12 YEARS	35	26.31
TOTAL	133	100
<i>Table 1: Showing Age At Presentation</i>		

The gender distribution of the study subjects were 83 (Males) and 50 (Females). Ratio is 1.7: 1.

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GENDER	NUMBER	PERCENTAGE
MALE	83	62.41
FEMALE	50	37.59
TOTAL	133	100

Table 2: Showing Sex Incidence

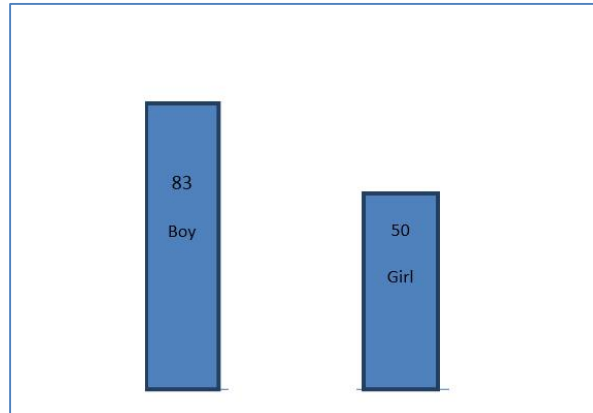


Table Showing Sex Incidence

RELIGION	NUMBER OF CASES	PERCENTAGE
MUSLIM	80	60.15
HINDU	52	39.09
CHRISTIAN	01	0.751
TOTAL	133	100

Table 3: Showing Religion Distribution in Present Study

PRESENTING COMPLAINTS	NO. OF CASES	PERCENTAGE
FEVER	120	90.22
COUGH	106	79.69
BREATHLESSNESS	48	36.09
PAIN ABDOMEN	10	7.51
ABDO.DISTENSION	04	3.0
CHEST PAIN	16	12.03
JOINT PAIN	01	0.75

Table 4: Showing Presenting Symptoms

SIDE	NO.OF CASES	PERCENTAGE
LEFT	65	48.87
RIGHT	64	48.12
BILATERAL	04	03.00
TOTAL	133	100

Table 5: Showing Side of Empyema Thoracis

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ORGANISM	NO.OF CASES	PERCENTAGE
NO GROWTH	115	86.4
STAPH. AUREUS	11	8.27
ESCHERICHIA COLI	05	3.75
PSEUDOMONAS	02	1.50

Table 6: Showing Microbiological Spectrum of Pleural Fluid

Modality of treatment: all the patients were started with parenteral fluids, antibiotics, oxygen and other supportive measures as required. Chest tube was inserted in all the 133 cases. Out of which 23 patients had undergone open thoracotomy whereas only two had undergone video assisted thoracoscopic procedure.

HOSPITAL STAY(DAYS)	RANGE	MEAN
TUBE THORACOSTOMY	3-33	12.20
THORACOSTOMY	10-60	24.37

Table 7: Showing Hospital Stay in Present Series

DISCUSSION: Empyema thoracis is a life threatening emergency. Though the incidence of empyema thoracis has declined in the west due to the effective use of broad spectrum antibiotics but it still remains a significant health problem in developing countries due to low socioeconomic status, malnutrition, and delay in diagnosis of pneumonia, delayed referral to higher center. Furthermore, the appropriate management of pediatric empyema thoracis remains controversial. There are varied findings in etiology, microorganism involved. Prognosis and management differ from series to series. Appropriate antibiotic therapy and drainage of the pleural space remain the first line of therapy.

The age and gender distribution of empyema in children in Asian countries are similar to the Western world. Empyema thoracis are more common in boys than girls. In our study male to female ratio was found to be 1.7:1. This observation was similar to findings in the other studies. In our study, the religious distribution was analyzed in a Hindu dominated geographical location. Muslim constituted the largest number with 80, Hindu 52 and a single Christian. Literature mentioning religious distribution had not been found. Empyema thoracis is usually unilateral with rare bilateral involvement. Our study differ from other series as left side involvement was marginally more.

The clinical manifestations of empyema are highly variable depending on the nature of the infecting organisms and the competence of the host response. In our study fever was the commonest symptom followed by cough which was comparable with other studies. Infection in lower lobe may present with abdominal complaints.⁷

In the recent multicentric UK study, only 17% of cases were culture positive and even using newer molecular techniques for example, pneumococcal or broad range polymerase chain reaction (PCR)–an etiological agent was only detected in 75% of culture negative cases. In our study too, only 14% of cases had organism growth which was similar to other studies. This was attributed to the prior antibiotic therapy before the referral to our hospital. Staph. Aureus was the commonest organism similar to other studies.^{8,9}

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In our study, 133 cases fulfilled the criteria and were subjected to chest tube drainage. Out of which 108 (81.2%) recovered from the disease. This study suggested overall 60-80% of cases responds to conservative management but hospital stay may be prolonged. The rest 25 patients required further management by surgical intervention.¹⁰

The hospital stay was longer for patients who underwent decortication as the patient's general condition was very poor at presentation and thoracotomy was generally kept as second line of treatment after chest tube drainage failure.

CONCLUSION: Empyema thoracis remains a common problem that carries significant morbidity and potential mortality. They were more frequently encountered in the age group of 1-6 years of age and males were more commonly affected than females.

Fever and cough were the most common presenting symptoms. On culture of pleural fluid, staphylococcus aureus were the most commonly isolated organism. Eighty one percent (81%) of cases responded to chest tube drainage alone, highlighting the importance of the procedure in the management of the disease and the need of treating doctors to be well versed with this simple bedside procedure.

It is generally accepted that regardless of the method employed to treat the disease, prognosis of the disease in children is exceptionally good, unlike in adults. However timely performed procedure carries low morbidity, providing rapid resolution of symptoms with a shorter hospital stay. Resolution of fever, duration of chest tube in situ and duration of hospital stay is a reliable parameter to assess outcome.



Fig. 1: Chest Tube drainage



Fig. 2: Pus in chest tube drainage bag

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Fig. 3: Showing Decortication Procedure

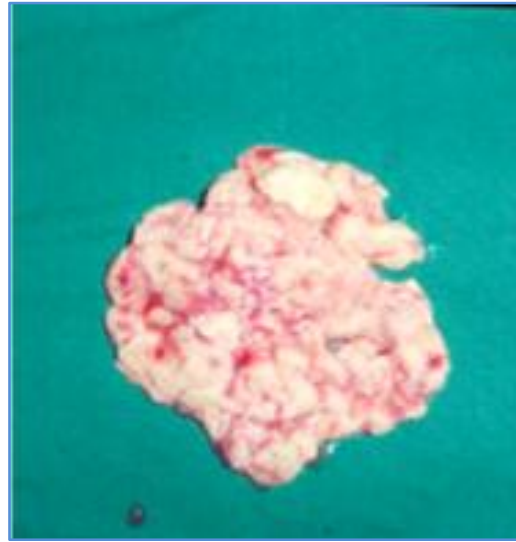


Fig. 4: extracted pus

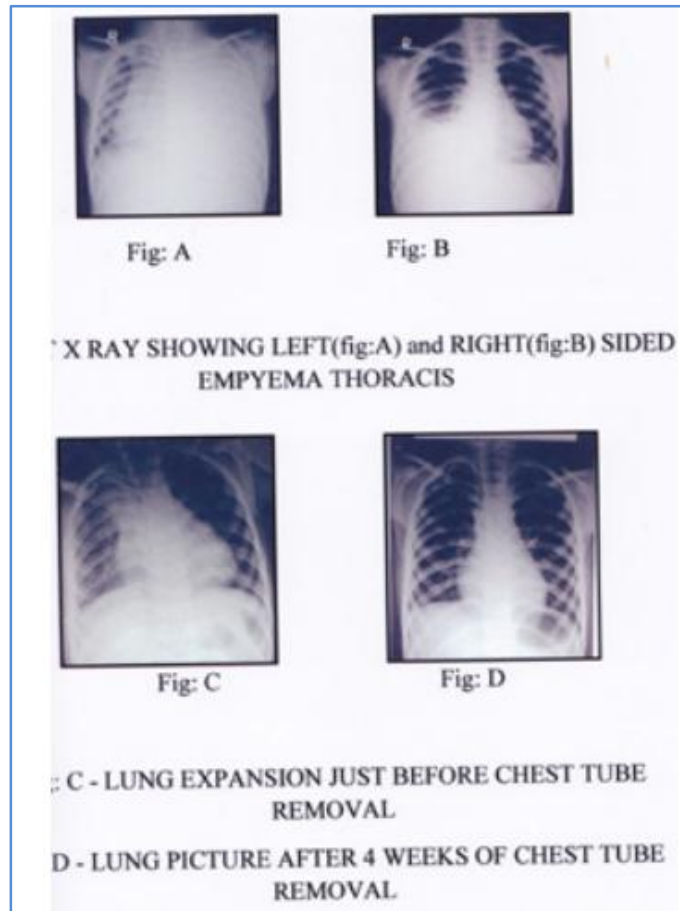


Fig. 5: Chest X-Ray of a case of Empyema Thoracis

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