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Original Research Article

To Study the Clinico Bacteriological Profile and Outcome of Empyema Thoracis in Children between 1 Month to 12 Years

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Abstract

Objective: To study the clinic bacteriological profile and outcome of Empyema Thoracis in children between 1 month to 12 years of age admitted at Calcutta National Medical College and Hospital (CNMCH), Kolkata. ***Methods:*** Study subjects were enrolled from children admitted at Paediatrics Department of CNMCH, Kolkata with fever, cough, respiratory distress and diagnosed as Empyema Thoracis by basic investigations like Chest X Ray (CXR), Pleural fluid analysis,Ultrasonography of Chest (USG chest), blood culture and sensitivity. ***Result:*** Rapid diagnosis by basic investigations and early initiation of IV antibiotics with intercostal chest tube drainage was an effective method of therapy. The common organisms isolated were Staphylococcus aureus and Streptococcus pneumoniae. Only 4% cases of the sample size required surgical intervention. Malnutrition was an important co morbid condition. ***Conclusion:*** IV antibiotics and intercostal chest tube drainage is an effective means of therapy of Empyema Thoracis in children at resource poor settings.

Keywords: Empyema Thoracis, Malnutrtion, intravenous antibiotics, intercostal chest tube.

INTRODUCTION

Empyema Thoracis (ET) is accumulation of pus within the pleural space. Despite the availability of broad spectrum antibacterial drugs, improved vaccination coverage and better diagnostic tools, ET remains associated with high morbidity worldwide. Pathologically empyema develops in three stages; exudative, fibrinopurulent and organized stage.

The rise in the incidence of ET, is because of multidrug resistant pathogenic microorganisms, delay in early diagnosis, failure to institute appropriate management in time, malnutrition, co morbidities, poor health seeking behavior and high treatment cost burden.

Optimal management of Pediatric Empyema is still controversial and the best management option is not clear. The available treatment options include intravenous broad spectrum antibiotics either alone or in combination with surgical procedure, thoracocentesis and intercoastal chest tube drainage, fibrinolytic therapy, decortications with Video Assisted Thoracscopic surgery (VATS) and open drainage.

The objectives of this study is to determine the clinico bacteriological profile of ET in children and delineate the appropriate management stratergy.

MATERIAL AND METHODS

A prospective study conducted in the Paediatrics Department of CNMCH, Kolkata. The duration of study was one and a half years and the sample size was 50. Children between 1 month and 12 years of age with diagnosis of Empyema according to ICD 10 J86 were included in the study and children with prior chest tube drainage or any surgical intervention were excluded. A standardized case report was developed to collect data on demographic, clinical and diagnostic methods, treatment and outcome measures in all cases. The investigations done were CBC,ESR, CRP, Serum Electrolytes, Blood Culture, Sputum for AFB, CBNAAT and Mantoux Test. Pleural fluid was analysed for pH, Cell Type, Cell count, glucose, LDH, ADA, Gram stain, ZN stain and Culture. CXR and USG of Chest was done in all cases while CT Scan of Chest was done in non resolving cases. After discharge all patients were followed up for a period of 6 weeks. (visits on 1, 3 and 6 weeks).

RESULTS

In this study, it was found that 14% patients were <12 months, 64% patients were between 13-60 months and 22% patients were >60 months. 84% of patients had fever for more than 7 days duration while 64% had PEM as assessed by anthropometric measurement. According to clinical features, 84% of had cough, 56% respiratory distress, 20% pain abdomen, 18% altered sensorium, 80% pallor and 64% raised temperature on admission. On clinical Examination, 80% patients had a bulge of the chest wall, 70% had mediastinal shift, 90% had dullness on percussion and 88% had decreased breath sounds on the affected side. Investigation findings of Chest X ray, 44% patients had pleural effusion of left side and 42% had pleural effusion of right side.

Blood culture and sensitivity reports revealed, 6% patients had growth of Enterococcus, 4 % Pseudomonas, 8% Staphylococcus, 2% Streptococcus, while 80% patients had no growth in blood culture.On Pleural fluid analysis 22% patients had mostly mononuclear cells and 78% had PMN's. Culture of Pleural fluid showed growth of Enterococcus in 2%, Pseudomonas in 4%, Staphylococcus in 8% while 86% had no growth in pleural fluid. AFB was not detected in CBNAAT of pleural fluid of any patient and 4% patients had a positive Mantoux Test. USG Chest was done in all the cases while 40% non resolving cases required CECT of thorax.

Amoxyclav was used as the first line antibiotic in 64% cases and Ceftriaxone was used in 36% cases. Ceftriaxone was used as the second line antibiotic in 60% patients and Vancomycin in 40% patients. Meropenem was used as the third line antibiotic in 20% patients and Vancomycin in 16% patients. The duration of IV antibiotic therapy was 14 days in 72% patients and 21 days in 28% patients. ICD was needed in 82% patients and the mean duration of ICD tube was 5.8780+-1.0049 days. 4% patients needed decortications. All the patients were successfully discharged.

Table-1: Clinical Manifestations of Empyema Thoracis

Clinical Features	Cases in %
Fever > 7 days	88%
Cough	84%
Respiratory Distress	56%
Chest Pain	70%
Pain Abdomen	20%
Altered Sensorium	18%
Pallor	80%
Chest Wall bulge	80%
Mediastinal Shift	70%
Dullness on Percussion	90%
Decreased Breath Sounds	88%

Table-2: Investigations of Empyema Thoracis

Investigations	Cases in %
Pleural Effusion In CXR	86%
CRP > 6mg/dl	90%
Growth in Blood Culture	20%
Mostly PMN's in Pleural Fluid	78%
Growth in Pleural Fluid Culture	14%
AFB detected in CBNAAT of Pleural fluid	0
Positive Mantoux Test	4%
USG Chest Done	100%
CT Scan of Thorax	40%

Table-3: Management of Empyema Thoracis

IV Antibiotic and Invasive Therapy	Response Rate in %
Amoxyclav as first line Antibiotic	64%
Ceftriaxone as first line Antibiotic	36%
Ceftriaxone as second line Antibiotic	60%
Vancomycin as second line Antibiotic	40%
Meropenem as third line Antibiotic	20%
Vancomycin as third line Antibiotic	16%
ICD drainage	82%
Decortication	4%

DISCUSSIONS

Kumar A *et al*., [1] found that 25 children (17 males) were identified with empyema with a median (range) age at presentation of 3 years (4 months-11 years). 23 were malnourished, and 5 had severe wasting. Fever, dyspnea and cough were the most common (90%) manifestations at admission. Median (range) duration of fever was 12 days (5 days - 3 months). In this study we found almost similar response.

Goyal *et al*., [2] found that to the mean age of the study group was 5.44 years and 48.6% were male and 51.4% were female. The most common symptoms at admission were fever (90%), dyspnoea (73%), cough (70%) and chest pain (23%). Pleural fluid cultures were sterile in 60% of patients. The most frequently identified micro-organisms was *Staphylococcus aureus* (34.2%). Treatment with chest tube drainage was successful in 55 (78.6%) patients. Three patients got expired. Twelve patients had decortications, all of which were successful. The lung re-expansion time was 8.00 ± 1.68 days (range: 5-13 days) in those patients in whom chest tube drainage was successful, whereas it was 7.50 ± 2.623 days (range: 4-14 days) in patients in whom decortication was done. The post-procedure stay was 10.00 ± 1.809 days (range: 7-15 days) in patients with successful chest tube drainage and 9.5 ± 2.902 days (range: 6-17 days) in case of decortication cases. In our study, 2 cases out of 50 cases presented with non resolving Pneumonia. On CECT several septate effusion was seen which required decortications. No death occurred.

Jain A *et al*., [3] found that Empyema is an uncommon complication of childhood pneumonia. Although mortality rates in pediatric empyema are very low, empyema causes significant morbidity including substantial health care costs and burden of care. Mean age of children was 5.01 years with slight female predominance (M:F = 2:3). Mean haemoglobin was 9.45 g/dl, Total leucocytes count (TLC) 17,293 with platelet counts 2.69 lakhs. PH of blood and plural fluid was 7.39 and 6.98 respectively. Cough was the most common complain (in 72%) followed by fever, breathlessness and chest pain. In this study, fever for more than 7 days (88%) and cough (84%) followed by chest pain was the main presenting symptom.

Laishram N *et al*., [4] found that majority of patients (0.64%) were seen in age group of 1-5 years. Fever (96%), breathlessness (92%), and cough (72%) were the commonest presenting features. Bacteriological examination revealed staphylococcus aureus as the commonest etiologic agent (20%) isolated from pleural fluid culture. Pyopneumothorax (16%) was the commonest complication seen in these patients. All patients (92%) were treated with antibiotics, and drainage of the empyema was effected by closed thoracostomy in (92%) of the cases.

CONCLUSION

Majority of the patients of age below 5 years responded to iv antibiotics and intercostal chest tube drainage. They showed good pleural recovery on follow up. In conclusion, intravenous antibiotics and chest tube drainage is an effective means of treating empyema thoracis in children especially in resource poor settings. Surgical intervention was needed in some patients and showed good recovery. Associated malnutrition was an important co morbid condition.

REFERENCES

1. Kumar, A., Sethi, G. R., Mantan, M., Aggarwal, S. K., & Garg, A. (2013). Empyema thoracis in children: a short term outcome study. *Indian pediatrics*, 50(9):879-82.
2. Goyal, V., Pandey, O., Sahai, A., & Waters, B. (2006). Attribute-based encryption for fine-grained access control of encrypted data. In *Proceedings of the 13th ACM conference on Computer and communications security* (pp. 89-98). Acm.
3. Jain, A., Devadiya, M., Mane, S., Meena, M., & Verma, M. Clinico-etiological profile of Empyema Thoracis in children: A Descriptive Analysis.
4. Laishram, N., & Ngangom, D. (2016). Empyema thoracis in children: a clinical study. *Tuberculosis*, 4;2:8.