

Treatment of childhood empyema

Nermin GÜLER, Nuran SALMAN, Ülker ÖNEŞ, Işık YALÇIN,
Tansu SALMAN, Alaaddin ÇELİK

Departments of Pediatrics and Pediatric Surgery, Istanbul Faculty of Medicine, Çapa, Istanbul

Summary

Postpneumonic empyemas develop following bacterial pneumonias, which are still among the common diseases causing illness and death throughout the developing world. With the advent of potent antibiotics the mortality of empyema has been drastically reduced. This study reviews experience with 45 children admitted to our hospital from March 1985 to March 1989. With the ap-

propriate use of antibiotics, thoracenteses and tube drainage, all of our patients recovered. None of the patients required decortication or other surgical intervention. In children the resolution of the thickened pleura during the course of empyema is better than adults. The proper usage of antibiotics and drainage techniques seem to be effective in the pediatric age group.

Key words: Childhood empyema

Introduction

Empyema is a common complication of pneumonia in children. The history of this disease dates back to the time of Hippocrates. The introduction of antibiotics for therapy of empyema has been a major advance in treatment. The management of childhood empyema differs from center to center and even among physicians from various specialities. The purpose of this review is to report our experience with childhood empyema and to provide insight into the management of this problem.

Materials and Methods

The records of 45 children (18 girls, 27 boys) admitted to Istanbul University, School of Medicine, Department of Pediatrics from March 1985 to March 1989 with the diagnosis of postpneumonic empyema were analyzed retrospectively for etiologic factors, bacteriologic findings, treatment and prognosis. Ages ranged from 1.5 months to 15 years (mean 40.9 months). The minimal diagnostic criteria included postpneumonic pleural effusion without any underlying disorder plus one or more of the following:

1. Positive pleural fluid culture for bacteria
2. Positive gram stain for bacteria
3. Gross pus in appearance of the pleural fluid
4. Pleural fluid glucose level less than 40 mg/dl and pH less than 7.2.

Only 5 cases (11 %) were found to be below third percentile for weight. The follow-up period for each patient was one to three years.

Results

The average interval between the onset of illness and hospitalization was 12.4 days. Most patients had been treated with one or two antibiotics prior to admission (Table I).

Fever, cough and dyspnea were the most common symptoms and signs. Thirtyeight patients had fever,

Table I. Antibiotic treatment before admission to the hospital

Treatment	Number of cases	Percentage
No antibiotic	14	31.1
1 antibiotic	13	28.8
2 antibiotic together	11	24.4
2 antibiotis subsequently	7	15.5

Table II Organisms isolated in pleural fluid

Organism	Number of cases	Percentage
Staphylococcus aureus	12	26.6
Staphylococcus epidermidis	1	2
Klebsiella oxytoca	2	4
Klebsiella pneumoniae	2	4
No growth	28	64.4

Address: Dr. Nuran SALMAN, Assoc. Prof. of Pediatrics, Department of Pediatrics. Istanbul Faculty of Medicine, Çapa, Istanbul, Turkey

Table III. Treatment of empyema in 45 patients

Treatment	Number of cases	Percentage
Antibiotics + thoracenteses	6	13
Antibiotics+thoracenteses+closed		
Tube thoracostomy	39	87
Decortication or empyemectomy	0	-
Pulmonary resection	0	-

thirtyfive cough and thirtyone severe dyspnea. The empyema was right sided in 26 patients and on the left side in 19. In eighteen cases, pleural fluid cultures gave positive yield for various organisms. The most common organism observed was *S. aureus* (Table II).

Antibiotics were instituted promptly in all patients after diagnosis. Closed tube drainage was performed in 39 patient. The rest of the patients benefited from repeated throcenteses (Table III). The chest tube was kept in place as long as fluid drained from the pleural space (Mean: 10.4 days).

The average duration of hospitalization in our study was 26.8 days. No deaths occurred in this group. Decortication was not required in any of our patients.

Discussion

Pneumonia is a common disease and the most frequent cause of mortality among children in the developing world. Pneumonia incidence in children less than 5 years is 30-40 per 1000 in the USA whereas in China, India and Papua, New Guinea the rate is 90-110 per 1000 (8). Our university hospital is one of the biggest centers in İstanbul city, a metropolis with a population of approximately eight million. In 1988, 81 of 308 patients admitted to the Department of Pediatric, Infectious Diseases Unit were diagnosed as lower respiratory tract infection.

Bacterial pneumonia is associated with pleural effusion in 40 % of the cases (6). Although most of these effusions resolve spontaneously, bacterial invasion occurs in approximately 10 %, necessitating tube drainage for resolution. Mortality and morbidity are higher in these complicated effusions (6).

There has been a change in the etiologic agents causing empyema. While pneumococci were responsible for the majority of cases before the use of penicillin, an increase in staphylococcal empyema was observed after the introduction of this antibiotic (1,4,5,9,11). *Staphylococcus aureus* was the most common etiologic agent isolated from our patients (26.6 %). Most of our patients were treated with one or more antibiotics before admission. This finding accounts for the low growth rate of organisms in the cultures. Unfortunately, we were not able to utilize appropriate techniques for cultivation of anaerobic bacteria in these patients.

There are many arguments in the literature on the management of childhood empyema. Some have favored early decortication and even parenchymal resection (e.g. lobectomy) if there is no response after treatment with antibiotics and closed chest drainage. Light (5) recommends a course of 7-14 days of pleural drainage and appropriate antibiotics before deciding to perform decortication or open thoracotomy. For Foglia and Randolph this period is approximately 20 days (2) whereas for Solak et al it is only 5-10 days (10). To facilitate lung expansion through removal of the thick peel forming over the pleura is the main reason given for early intervention by these authors. In children, the thickened membranous pleura has a capacity to resolve better than adults due to the inherent elasticity both of the thoracic cage and of the normal lung tissue (3).

Some authors have advocated delaying decortication for weeks if the child is doing well clinically (3,7). Our experience also favors such an approach as none of our patients required decortication. We have observed that adequate reexpansion of the lung is possible without decortication.

The duration of hospitalization is an important index of the clinical course of empyema. The clinical course of empyema is much shorter in children as compared to adults, as shown by shorter duration of hospitalization (4). In our series the mean hospital stay was 26.8 days, similar to other reports in children.

In conclusion we recommend conservative treatment with antibiotics and closed chest tube drainage for therapy of postpneumonic empyema in children.

Surgical intervention may be considered only in cases where clinical deterioration is observed. If antibiotics are used properly there will usually be no need for surgical procedures in children. Long-term follow-up shows that the great majority of children can achieve clinical and roentgenographic resolution without surgery.

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