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ORIGINAL ARTICLES

Empyema in children: A review of 52 cases

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SUMMARY

A prospective study was undertaken to assess the clinical pattern, management and outcome in children admitted with empyema at Harare Hospital. Fifty-two children were seen and followed up during the three-year period, 1984-1987. All patients were managed with intrapleural drain and antibiotics. Two needed decortication.

The predominant pathogen isolated from the pleural cavity was *Staphylococcus aureus*. All survived and on follow up only one child was found to have persistent radiological abnormality and poor exercise tolerance.

Early intrapleural drainage and appropriate antibiotics should be the mainstay of treatment for empyema for the majority of children in Zimbabwe.

INTRODUCTION

Purulent pleural effusions in children have become less frequent in developed countries with early and

adequate treatment of pneumonia.¹ In contrast, studies from developing countries indicate that empyema in children remains a significant cause of morbidity and mortality.^{2,3}

In Zimbabwe, despite intensive and widespread primary health care programmes since 1981 post pneumonic empyema in children is frequently seen, especially at referral hospitals. To assess the extent of this problem, a prospective study was undertaken at Harare Central Hospital to determine the clinical pattern, management and outcome of children admitted with empyema.

PATIENTS AND METHODS

The study was conducted at Harare Hospital which is a referral centre for the surrounding municipal clinics and provincial health centres. During the period March 1984 to February 1987, all children below eight years of age admitted with a diagnosis of empyema, confirmed by aspiration of pus were included in the study.

The pus was examined by Gram stain and also cultured for micro-organisms. Chest X-ray and full blood count were done on all patients and repeated when indicated.

Intrapleural drains were inserted in all children. In 34 (60 pc) underwater, seal drainage was used in 40 pc "Thompson's drain" was used.⁴ Initially all were treated with intravenous antibiotics which were changed if necessary after culture and sensitivity results were obtained. Antibiotics were given for a total of six to eight weeks. Clinical evaluation of the respiratory system was undertaken daily.

After discharge from hospital the patients were followed up in the outpatient clinic at intervals of 4, 12, 24, 48 and 96 weeks. Progress was assessed on the basis of clinical and radiological findings.

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RESULTS

Clinical features: A total of 52 children were admitted with the diagnosis of empyema during the three-year period. Thirty-nine (75 pc) patients were referred from peripheral hospitals, the reason for referral being failure to improve on medical treatment. The ages ranged between three to 72 months (Figure I) with the majority of patients being between 12 and 30 months (69 pc). There were 38 males and 14 (36 pc) females.

Figure I: Age distribution in empyema

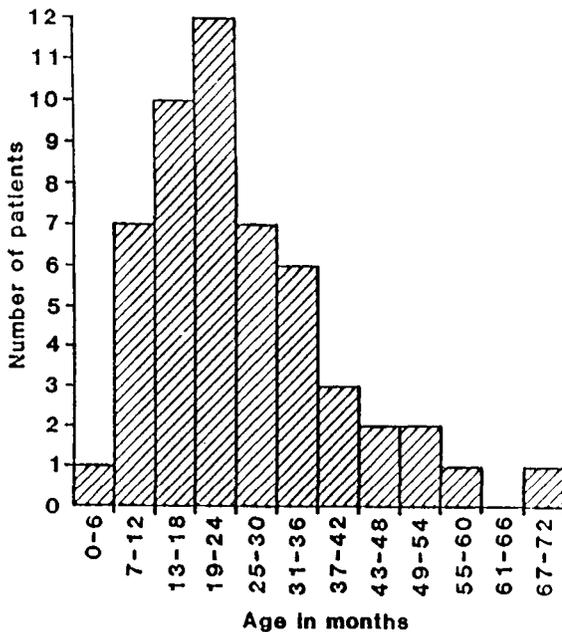


Table I: Presenting symptoms in 52 children with empyema

Symptoms	Number	pc
Cough	48	92
Fever	45	87
Dyspnoea	40	76
Lethargy	22	42
Chest pain	16	30
Vomiting	3	5

Cough was the most common presenting symptom, followed by fever and dyspnoea (Table I). In twenty-two children there was history of lethargy and

16 mothers complained that their children had chest pains. Three had vomiting following bouts of coughing.

Thirty-one patients had been treated for pneumonia for varying duration (range 2-14 days) before being referred to Harare Hospital. In 10 patients measles bronchopneumonia preceded empyema. Four children had been treated by repeated thoracocentesis (3, three times and 1, two times) before referral. The majority (44) had a satisfactory nutritional status (>90 pc of the standard weight for age), four were underweight and four were marasmic according to the Wellcome classification.⁵ Only six children were pyrexial on admission with temperatures ranging between 38,8°C and 39,6°C. Tachypnoea (respiratory rate >50/min) was present in all children. Intercostal recession was noted in 37 (71 pc) patients while "stony dullness" on percussion was elicited in all of the children.

Thoracocentesis: No attempt was made to aspirate the pus to "dryness". On microscopy presence of polymorphonuclear cells were confirmed and gram positive cocci were reported in 12 patients (23 pc). The results of organism cultured from pleural aspirates are shown in Table II.

Table II: Results of cultures of pus drained from the pleural cavity

Organisms cultured	Number	pc
Staphylococcus aureus	11	21
Haemophilus influenzae	4	8
Streptococcus viridans	4	8
Klebsiella	3	5
No growth	30	58
Total	52	

Tube thoracotomy and drainage: The amount of pus drained initially in the 24 hours from the intrapleural tubes ranged from 120ml to 1 200ml. Smaller volumes continued to drain over the next few days and drainage was discontinued when volume decreased to less than five ml in 24 hours. There was a marked drop in temperature almost immediately after the intrapleural drain was inserted.

The children were also started on regular chest physiotherapy. Early mobilisation was encouraged with the underwater bottles being supported by their mothers and/or nurses.

Decortication: Two of the children were found radiologically to have developed a fibrinous band tethering the lung. At thoracotomy empyema sacs and the fibrinous bands were excised. In both cases the lung re-expanded well.

Outcome and follow up: All children survived. Follow up ranged from eight weeks to 96 weeks (median 24 weeks). Except for one child, all were asymptomatic with normal activity and exercise tolerance and radiologically normal when finally discharged.

DISCUSSION

Empyema in children remains an important complication of pneumonia in developing countries. Factors which may contribute to the high incidence of empyema include delayed treatment of pneumonia, malnutrition and measles.^{2,3,6}

In this study most frequently affected age group was one year to three years. This age distribution is consistent with the incidence of pneumonia.⁷

Empyema as a complication of measles bronchopneumonia is well known.⁸ In our study 20 pc of the cases were preceded by measles whilst previous studies from Zambia³ and Nigeria⁶ reported 44 pc and 27 pc of cases respectively. The majority of our patients (85 pc) were well nourished (weight for age >90 pc of standard).

In less than half (42 pc) of the patients organisms were isolated from the pleural aspirates. The frequency of isolation of organism in our study was modified by prior antibiotics in a high proportion of referred children. Failure to culture anaerobes in our laboratories may have played a role as well.⁹ *Staphylococcus aureus* was the most frequently isolated pathogen from the pleural aspirate. Studies from other developing countries have reported similar findings.^{2,3}

In the USA, however, *Staphylococcus aureus* as a causative agent for childhood empyema is declining and *Streptococcus pneumoniae* and *Haemophilus influenzae* are becoming predominant.¹⁰

The diagnosis of empyema usually created no difficulties. The two principles of management are early sterilisation with appropriate antibiotics and adequate drainage of pleural space.¹¹ However, management remains controversial and methods employed for the drainage of the pleural cavity range

from repeated thoracocentesis, intrapleural drainage to early decortication.¹² Thoracocentesis may provide adequate drainage for small exudative empyema but is not advocated for use in the fibrinopurulent phase or in children with *Staphylococcus aureus* empyema.¹³

In our children, however, we opted for early intrapleural drainage, antibiotics, active chest physiotherapy and mobilisation of the children when possible. The latter was facilitated by the use of Thompson's "pleuradrane" plastic bags.⁴ In all except two, lungs re-expanded with no residual pulmonary or pleural radiological changes. The two who required decortication had had repeated thoracocentesis at the peripheral hospitals and on drainage were found to have "empyema cavity" with thick fibrinous bands tethering the lungs.

Thoracocentesis should be used to confirm the diagnosis and if the aspirate is purulent an intrapleural drain should be inserted. Repeated thoracocentesis carry the risk of pneumothorax and also introducing super added infection into the pleural cavity.

Case fatalities ranging from 6 pc to 36 pc have been reported from developing countries.^{2,3,6} In our study none died and a 96 pc success rate was achieved with intrapleural drainage and antibiotics.

In children, improved nutritional status, effective measles immunization programme, early and adequate treatment of pneumonias may help to reduce the frequency of empyema. Early intrapleural drainage and appropriate antibiotics should be the mainstay of treatment for empyema for the majority of children in Zimbabwe.

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