Parapneumonic Effusion, Children, Epidemiology, Management, Ile-Ife

A Ten Year Review of Parapneumonic Effusion in Children seen at OAUTHC, Ile-Ife, Nigeria.

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Background: Parapneumonic effusion has remained a very common complication of pneumonia in children and a contributor to its adverse morbidity and mortality. There has not been a recent documentation of its burden among Children in our centre.
Aims and Objective: This study thus aims to document the pattern, management, and the outcome of Parapneumonic effusion seen among children at the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife over a 10 year period.
Methodology: A retrospective review of all the cases of Parapneumonic effusion over the period January 1999 to December 2008 was undertaken. Relevant data from their files were extracted into a proforma and analyzed.
Results: There were sixty four cases of pleural effusion in children between the ages of 1 month and 15 years. Pleural effusion accounted for 0.32 per cent of the total admission into the paediatric wards for the period under review. Of the 64 cases, 2 were excluded from the study because they were not parapneumonic. Of the 62 cases included in the study, 29 (46.8 %) are female and 33 (53.2 %) male. Even though all ages are affected, the incidence is particularly high in children under one year, accounting for 31 (50.0%) of the cases.
Conclusion: Parapneumonic effusion complicates paediatric community acquired pneumonia especially in children who present late to medical facilities. Staphylococcus aureus is the most common causative agent in children with positive pleural aspirate cultures.
Key words: Parapneumonic effusion; children; epidemiology; management, Ile-Ife.

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INTRODUCTION

Respiratory diseases are a leading cause of morbidi mortality among children and adults glc Although morbidity and mortality assoc pneumonia in childhood has decline complications from parapneumonic em to be an important global health [1,8]. Parapneumonic effusions are known compi tions of bacterial pneumonia, with effusions occurring in at least 40 % of bacterial pneumonia, and with up to 60 % of such effusions resulting in the formation of empyema.[9] The optimal management of parapneumonic effusion in children remains controversial and there is currently insufficient evidence to give clear guidance on appropriate therapy [10]. Although there are studies of childhood pleural effusion and empyema from some Nigerian cities [11,14], there are no such studies from Ile-Ife, Nigeria. The purpose of this ten-year retrospective study is to examine the epidemiological and clinical patterns, bacterial causes, management and outcome of childhood parapneumonic effusion in Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria.

METHOD

We performed a retrospective case note review of children with parapneumonic effusion admitted to the ediatric wards of the Obafemi Awolowo iversity Teaching Hospitals Complex T.H.C), Ile-Ife, Nigeria, from January 1999 er 2008. In each case diagnosis was based on clinical features and chest radiographic findings. The following data were extracted from each case note: hospital number, age, sex, presenting features, weight, physical signs, temperature, respiratory symptoms on admission, heart rate, chest x-ray findings, underlying pathology, packed cell volume (PCV), full blood counts (FBC), total and differential white blood counts, bacteriologic reports of pleural aspirates and blood culture, antibiotic treatment on admission, management of pleural effusion, complications, duration of stay and outcome.

All clinical and biochemical data analyzed were entered into a computerized database. Quantitative and qualitative variables were statistically studied using the SPSS program (version 16.0) for Windows. Significance level was put at $P<0.05$.

RESULTS

There were 64 children with pleural effusion, diagnosed with chest radiograph and/or thoracocentesis, representing 0.32% of the total admission (19903) in the paediatric wards during the period under review, with the highest case

occurrences occurring in the years 1999 and 2007 (13 cases each), see figure 1. Sixty two of these patients had evidence of pneumonia on chest x-ray, while two patients, a three year old boy, who had left sided body swelling, with septicaemia, had empyema thoracis, and a four year old boy, who had nephroblastoma, with metastasis to the lungs and a right sided pleural effusion did not have pneumonia. Of the 62 parapneumonic cases, Twenty nine (46.8%) were female and 33 (53.2%) males, aged 1 month to 15 years (mean age 36.6±6.3 months). Fifty two (80.6 %) of the children were between 1 month and 5 years (see figure 2). Peak age incidence was in the first year of life representing 50.0% of all cases.

Twenty eight (45.2%) children had left sided involvement, and 33 (53.2%) had right sided involvement, while 1 (1.6%) was bilateral.

At presentation the most common symptoms were cough 55 (88.7%), fever 53 (85.5%), and dyspnoea 53 (85.5%), see figure 3. Chest pain was present in 9 (14.5%) and abdominal pain in 5 (8.1%). The mean duration of symptoms before hospital admission was 15.5±4.7 days (range 1-210 days) for cough, 11.5±0.6 days (range 1-180 days) for fever, 3.8 days (range 0-30 days) for breathlessness and 1.5 days (range 0-21 days) for chest pain. The most common signs were reduced breath sounds on the affected side, dull percussion note, chest wall recession and conjuctival pallor. The mean respiratory rates for various ages are as follows: 0-12 months, 71.9 ± 2.6 (range 44-120); 13months -5 years, 62.1 ± 2.8 (range 36-80); >5 years 50.4 ± 2.4 (range 40-64). The mean heart rates also for various ages are 0-12 months 171.2 ± 3.8 (range 120-220), 13 months – 5 years 158.1 ± 3.9 (range 114-182), >5 years 129.9 ± 5.3 (range 106-168 b/m). Chest wall swelling was observed in 8 (12.9%) patients, and multiple abscesses in 4 (6.5%) patients.

Cardiac failure was found in 56 (90.3%) patients, spontaneous pneumothorax occurred in 3 (4.8%) patients and lung collapse was found in 4 (6.4%) patients, see Table 1. Three patients had associated pericardial effusion and two of these had needle pericardiocentesis, while one resolved with conservative treatment. All three had cardiomegaly clinically with distant heart sounds and chest radiograph confirmed cardiomegaly. Eighteen (29.0%) children were under weight.
None of the patients reported had a positive retroviral status. Haematologic profile showed a mean packed cell volume (PCV) of 26.4 ±5.8 (range 10.0 – 43.0). Forty five (72.6%) children were anaemic, 11 (17.7%) of whom

Table 1:
Other Associated Pathologies

Associated Pathology	Number of cases
Malaria	30 (46.9%)
Pericardial Effusion	3 (4.8%)
Pneumothorax	3 (4.8%)
Lung Collapse	4 (6.4%)
Under weight	18 (29.0%)

received packed cell transfusions. Mean total WBC was 16406 ± 3185 (range 2400 – 80400), the mean neutrophil count was 57.6 ± 4.1% (range 20.0–92.0%), mean lymphocyte count was 41.1 ± 4.0% (range 8.0 – 78.0%).

Thoracocentesis revealed that 42 (67.7 %) of the pleural aspirates were purulent, 11 (17.7 %) were serosanguinous, while 7 (11.3 %) were serous.

All 62 pleural fluid samples and 8 blood samples were cultured for bacteria. Twenty five (40.3%) of the 62 aspirates were positive for bacteria and 37 were sterile. Of the 8 blood cultures, 2 yielded the same organisms as in the corresponding pleural fluid, while one blood culture yielded klebsiella that was not found in the corresponding pleural fluid. As shown in Table 2, organisms isolated from the pleural aspirate included staphylococcus aureus in 16 (25.8%) cases, pseudomonas in 5 (8.1%) cases, streptococcus pneumoniae and klebsiella, 2 (3.2%) cases each.
Acid fast bacilli were stained for, but were negative in all the cases.

Thirty five (56.5%) patients had one chest x-ray, 14 (22.6%) had two, and 9 (14.5%) had three. All chest x-rays reveled pleural effusion.

The management consisted of drainage of fluid from the pleural space with a chest tube, administration of intravenous antibiotics, blood transfusion, appropriate anti-failure regimen, and oxygen therapy as needed. Closed-thoracotomy tube

Table 2:
Organisms isolated from pleural fluid of children.

Organism	No. of children (per cent of total)
Staphylococcus aureus	16 (25.8%)
Pseudomonas	5 (8.1%)
Streptococcus pneumoniae	2 (3.2%)
Klesiella	2 (3.2%)
No organism identified(sterile)	37 (59.7%)

drainage (CTTD) was done in 52 (83.9%) cases, the rest of the patients only had a small amount of fluid in the pleural space and were managed medically with antibiotics. The mean duration of chest tube drainage was 14 ± 2 days (range 1–72 days).

The most frequently used initial antibiotics were Ampicillin and Cloxacillin, Gentamicin, cefuroxime, crystalline Penicillin, singly or in combinations of two. Subsequently other antibiotics were substituted for the initial drug according to the sensitivity report or a poor clinical response. Thirteen (21.0 %) children whose clinical condition did not improve with antibiotics responded to anti-tuberculous drugs. These could be cases of tuberculous pleural effusion. Sputum culture for tuberculous was not done and pleural fluid is often not positive for acid fast bacilli.

Four patients (two males and two females) died, giving a mortality rate of 6.5% for this study. Two of these were below one year of age while the other two were 2 and 13 years respectively.

Discussion

This study shows that parapneumonic effusion accounted for 0.31% of total admissions into the paediatric wards of the Ife Health Unit of the Obafemi Awolowo University Teaching Hospitals Complex for the period under review. Although the incidence seems low when compared to other childhood illnesses, the condition is associated with considerable morbidity and a lengthy hospital stay with a mean duration of 22 days; range (2-75 days). It is also associated with a high mortality, accounting for 6.5% in affected patients in this study. All ages are affected but the incidence is particularly high in children below 2 years. There was no distinct seasonality observed, suggesting that weather may not be an important contributing factor. Perhaps if ultrasonography had been a routine practice at that time, the incidence of parapneumonic effusion may have been higher.

We observed that in a majority of the cases, the duration of symptoms before seeking medical attention/hospitalization was over three weeks. This trend was also observed by Aderele et al [11], who observed that medical attention was not generally sought until the onset of breathlessness.

The most common causative organism isolated from the pleural fluid in this study was staphylococcus aureus, followed by pseudomonas, streptococcus pneumoniae and klebsiella. This finding is in accord with the works of Aderele et al. (1974) that observed the same trend at the University College Hospital (U.C.H.), Ibadan, Nigeria, [11], and Hilliard et al. (2003), at Bristol Children's Hospital, Bristol, UK [10]. In the work by Oguonu et al. (2005) [14], streptococcus pneumonia was the leading aetiological agent (with three streptococcus pneumonia cases, followed by staphylococcus aureus with two cases) No organisms were isolated in 37 (59.7 %) samples. Sterile cultures in parapneumonic effusions may be due to such reasons as prior antibiotic use, culture-negative pneumococcal infection, anaerobic infections (anaerobic culture media were not routinely used in our laboratory), also viral and fungal agents were not routinely identified [1]. It will be good if our laboratories would include the use of non-culture-based antigen detection or polymerase chain reaction tests to detect both bacterial and viral pathogens in the assessment of parapneumonic effusion in the future.

Pericardial effusion is said to be associated with parapneumonic effusion [15]. In this study three patients had concomitant pericardial effusion, with two needing pericardiocentesis and all needed treatment with digoxin for heart failure. In the study by Jon E. Roberts et al. on the association between parapneumonic effusion and pericardial effusion in a paediatric cohort, using 2-dimensional echocardiography, chest computed tomography scan, or both, 54.2% of their patients were found to have concomitant pericardial effusion [15]. Pericardial effusion should thus be sought in any child presenting with parapneumonic effusion. The use of ultrasonography/echocardiography would assist in the diagnosis of associated pericardial effusion. Pleural biopsy was not performed in any of the children, however this could have provided more information on the causative organisms if carried out. The mortality rate of 6.5% is in keeping with the study by Oguonu et al. [14], in Enugu, who had a mortality of 7.5%.

Conclusion

Parapneumonic effusion occurred in 62 children representing 0.31 % of the total admission in the Paediatric wards in our Institution in the period under review. Fifty (96.3 %) were = 5 years and particularly vulnerable were infants, = 1 year, accounting for 31 (50.0 %) of the cases. Staphylococcus aureus was the most common causative organism isolated, followed by pseudomonas. Parapneumonic effusion complicates

paediatric community acquired pneumonia especially in children who present late to medical facilities. The onset of breathlessness causes the care givers to bring the children to the hospital for treatment. Public enlightenment on the need for early seeking of medical attention for children may go a long way in reducing the high morbidity and mortality.

There should be a high index of suspicion among clinicians attending to children with pneumonia. The routine use of ultrasonography to diagnose possible pleural effusion and pericardial effusion in children with pneumonia is desirable.

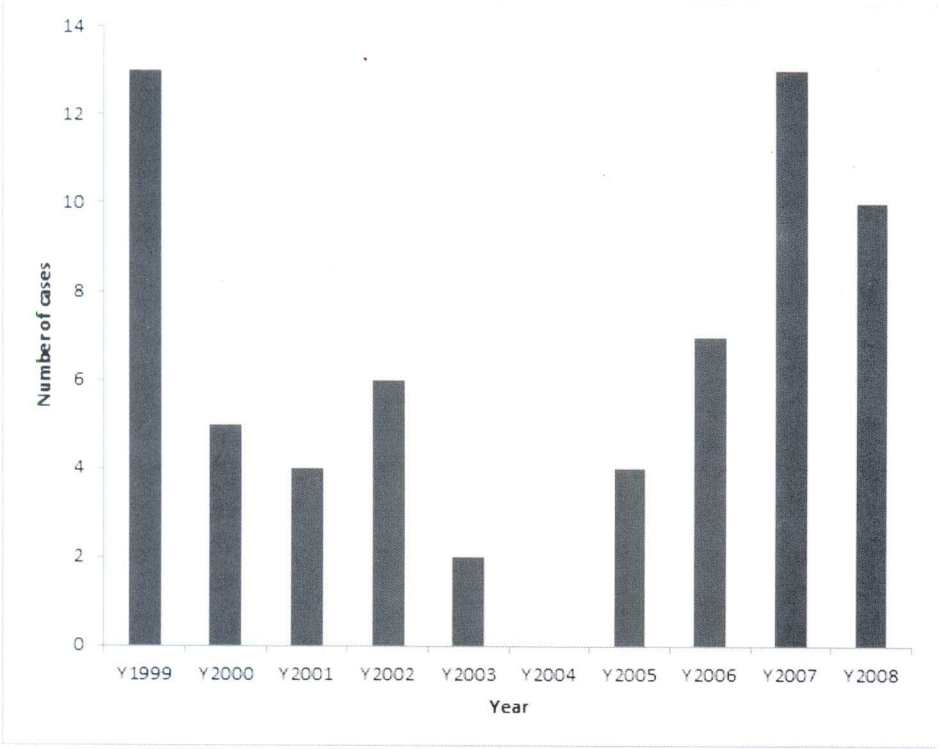

Figure 1:
Number of cases of pleural effusion admitted per year for the period 1999-2008

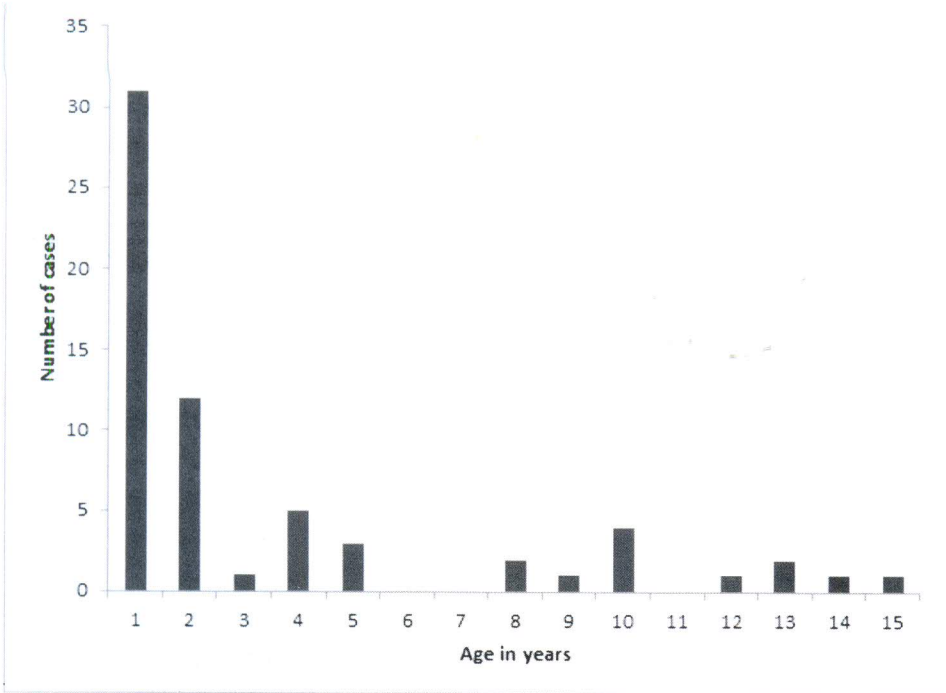

Figure 2:Age distribution of 64 children with pleural effusion

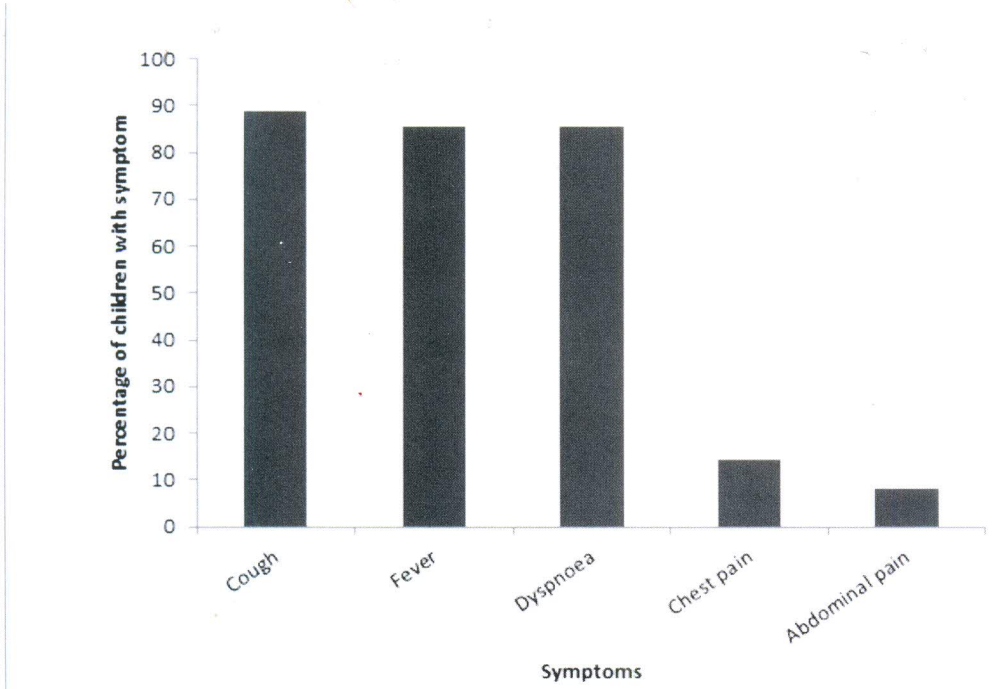

Figure 3:
Clinical presentation of children with pleural effusion: percentage of children with each symptom

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