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Lung Abscess in Children: A 12-Year Study in National Research Institute of Tuberculosis and Lung Disease

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ABSTRACT

Background: Lung abscess is a rare and jeopardizing disease particularly in children. Early diagnosis of the disease can prevent further complications. Delay in diagnosis not only increases the mortality, but also can lead to severe complications along with the need for surgical intervention. Hence, we decided to evaluate the clinical and para-clinical features of our cases to estimate the magnitude of the problem.

Materials and Methods: Data was obtained based on a retrospective study from 1992 to 2004, during a 12-year period in our centre. All the children who were admitted in NRITLD with lung abscess were enrolled in the study. Data was collected and analysed considering their age, gender, underlying disease, and aspiration history.

Results: A total of 17 children were identified including 12 boys and 5 girls. 12(70%) children were under 10 years of age. Nine had a history of interstitial lung disease while 12 children had history of aspiration. The most common complaints were cough (94%), fever (82%), and sputum (82%). Leukocytosis was observed in 76.5% of the cases while 70% showed shift to the left in their blood analysis. 60% of the cases were diagnosed only by CT-scan without any other evaluation. Gram positive organisms (*Streptococcus pneumoniae* 11.6% and *Staphylococcus aureus* 5.8%) were the most prevalent organisms involved in our cases.

Conclusion: According to this study, lung abscess is more prevalent in boys. The most common symptoms are cough, fever, and sputum. Furthermore, we suggest CT scan for diagnosing the disease because of its valuable role in detecting lung abscess in early stages. (*Tanaffos* 2004; 3(9): 27-31)

Keywords: Abscess, Lung abscess, Children

INTRODUCTION

Lung abscess is a necrotic cavitory lesion that contains pus and infection (1,2,3). Primary lung abscess occurs in the healthy host as a result of pneumonia or aspiration while the secondary form is seen in patients with underlying disease such as

bronchiectasis, immune deficiency, neurologic diseases, and post-tonsillectomy (2,3).

The prevalence of lung abscess is 7 in 100000 individuals. The disease is reported to be 7 times more prevalent in males (2).

The common clinical signs and symptoms are fever, cough, sputum, malaise, weight loss, dyspnea, hemoptysis, and clubbing. Leukocytosis with a shift

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to the left may be observed in most of the cases (3,4).

Anaerobes and gram positive organisms are commonly found in lung abscess and are the major organisms involved in the disease (4,5). Therefore, the critical part of the treatment of lung abscess is using appropriate antibiotics. Early treatment can prevent further complications and can reduce the chance of obligatory surgical interventions (6,7,8).

We could not find a comprehensive study of lung abscess in Iranian children. The aim of this study is to determine the prospective of the problem and to identify an appropriate treatment as well as analysing the complications in our children.

MATERIALS AND METHODS

This retrospective study was conducted from 1992 to 2004 during a 12-year period among the children who were admitted in NRITLD with diagnosis of lung abscess. Children between 0 and 16 years old were enrolled in the study. Data were collected and analysed considering their age, gender, underlying disease, aspiration history, laboratory (Leukocytosis, PMN, ESR, and CRP), and radiological findings. Lung abscess was diagnosed in the patients using clinical features, laboratory, and radiographic patterns besides other diagnostic procedures such as bronchoscopy. ESR was measured with Westergren value method and an ESR under 20 was considered as normal.

RESULTS

Seventeen children including 12(70%) boys and 5(30%) girls were studied. Among those, 12 children were under 10, and 5 children were between 10 and 16 years of age.

Cough (94%), fever (82%), and sputum (82%) were the most common complaints among children (Table 1).

Underlying diseases were found in 9 cases. The most frequent underlying diseases were immune deficiency, neurologic diseases, pneumonia,

tuberculosis, and chest wall trauma.

Leukocytosis, was observed in 13 (76.5%) cases and shift to the left was seen in 12 children. The mean ESR of the patients was 45 (mm in hour). Twelve children were reported to have a rise in ESR, and 6 children had a positive CRP (Table 2).

Table 1. Clinical manifestations among 17 children with lung abscess

Clinical manifestation	Positive (%)	Negative (%)
Cough	16 (94.1)	1 (5.9)
Sputum	14 (82.4)	3 (17.6)
Fever	14 (82.4)	3 (17.6)
Dyspnea	9 (52.9)	8 (47.1)
Haemoptysis	2 (11.8)	15 (88.2)
Malaise	14 (82.4)	3 (17.6)
Shaking and chills	4 (23.5)	13 (76.5)
Foul -smelling sputum	6 (35)	11 (65)
Weight loss	14 (82.4)	3 (17.6)
Clubbing	2 (11.8)	15 (88.2)

Table 2. Paraclinical findings among children with lung abscess

Paraclinical findings	Positive (%)	Negative (%)
Leukocytosis	13 (76.5)	4 (23.5)
Leukocytosis (shift to the left)	12 (70.6)	5 (29.4)
ESR rising	12 (70.6)	5 (29.4)
CRP positive	6 (35.3)	11 (64.7)

Four children were diagnosed only by chest x-ray, and 10(58.8%) were detected only by CT-scan. X-ray findings were non-specific in this group. One case was diagnosed using both CT-scan and ultra sonography while 2 cases were diagnosed using CT-scan and bronchoscopy.

Gram positive cocci were the most prevalent organisms found in the lesions. Among 17 children 5 underwent bronchoscopy. From those, bronchoalveolar lavage specimens revealed *Streptococcus pneumonia* in 1 case, *staphylococcus*

aureus in 1, and the rest were negative.

Aspergillus was found in sputum of one of our cases with CGD (Chronic Granulomatosis Disease). This finding could be well explained by the clinical and radiological findings of this patient. We should denote that we didn't use anaerobic culture in our cases. In this study from 17 children in the sputum and bronchoalveolar lavage, 2 cases had *Streptococcus pneumoniae* in their specimens, 1 case had *Staphylococcus aureus*, 1 had *Klebsiella*, 1 had *Pseudomonas*, and 1 case was reported to have aspergillus. In the remaining 11 cases, the specimens were negative (Figure 1).

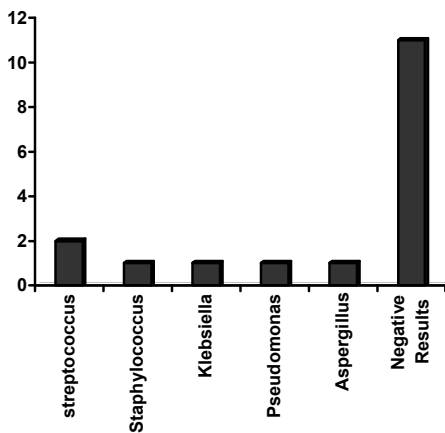


Figure 1. Different microorganisms in lung abscess among children

The most common involved site of the lung was the upper lobe of the right lung (47%) and then the lower lobe of the right lung (41%). Out of 17 children, 9 received medical treatment while was satisfactory and sufficient. Eleven children were treated by surgical interventions because of their poor response to the antibiotics. All of these children were in good condition and their outcome was good.

DISCUSSION

According to the study that was conducted in our center, 17 cases were found to have lung abscess during a 12-year period (1.5 cases in one year). In a

similar study in 1995 in the U.K, the number of 4 lung abscesses per year was reported (9) and in another study, the rate was 1 case per year (10). 70% of our cases were under 10 years of age. Another study in the United States revealed a mean age of 8-9.3 years (8), and in the UK 50% of the cases were under 10 years of age (9).

The data showed that the majority of the cases were boys (70%). A study conducted in the United States also showed the same result (11). In another study, Armando and colleagues found that boys were 1.6 fold more susceptible when compared to girls (2).

The most frequent underlying diseases were immune deficiency more specifically CGD, neurologic diseases particularly cerebral palsy, pneumonia, tuberculosis, and chest wall trauma. In another study in the year 2003 in Japan, the most common underlying diseases were neurologic diseases, immune deficiency, primary lung diseases, and congenital heart diseases (6).

In most of the studies, fever was recorded in 100% of the primary lung abscess and in 84% of the secondary lung abscess (4,11). In this study fever was enrolled in 82% of the cases.

Cough, sputum, malaise, weakness, and weight loss were observed in more than 50% of the cases. Previous studies also showed the same result (5,12,13).

Leukocytosis was seen in 76% with a shift to the left in 70% and a raised ESR in 70% of the cases. Other studies also reported rising number of white blood cells and ESR level (9,14,15).

Chest x-ray confirmed the diagnosis of lung abscess in 23% of the cases by showing cavitory lesions with air-fluid levels. Meanwhile CT-scan confirmed 60% of the cases with a definite diagnosis. A similar study by Johnson and colleagues showed that CT-scan was more reliable and precise in diagnosing lung abscess, assisting the physicians to locate the precise site of the abscess and

differentiation it from empyema and pneumatocele (15).

Unfortunately we could not perform anaerobic culture in this study and as a result in 11 cases, we did not find any pathogen. Gram positive cocci (*Streptococcus pneumoniae* and *Staphylococcus aureus*) were the most prevalent organisms in the lesions. Other studies reported anaerobes as the most prevalent pathogen (9,10,15). Another study in the United States conducted among mental retarded children, and those with dental problems who were susceptible to aspiration showed that in 90% of the cases combination of aerobes and anaerobes were responsible for their lung abscess (14).

In other study, in 15 children with lung abscess, 14 had a polymicrobial infection (12). Other study by Armando and colleagues showed that in the United States 89% of the lung abscess cases had anaerobes in their cultures; from those, 46% only had anaerobes and the rest had a combination of aerobes and anaerobes in their culture (2).

CONCLUSION

According to the results of this study the most common clinical pictures of the lung abscess are cough, fever and sputum. Leukocytosis with shift to the left are common in these children. This study showed that CT scan can be very helpful for early diagnosis of the disease besides the bacteriological and traditional approaches.

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