

Lung Abscess in a Child Unresponsive to Antibiotic Therapy

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Abstract

Lung abscess is a very rare infectious condition in children and is most commonly encountered as a complication of bacterial pneumonia. The majority of patients with lung abscess show an excellent response to antibiotic therapy and only in a minor group of cases, simple drainage or other surgical interventions are required. Empiric parenteral antibiotic therapy is the gold

standard in treatment of lung abscess in children. Here we present a 2.5 year-old girl who developed lung abscess during the course of a lobar pneumonia and required percutaneous drainage due to failure of resolution with conventional antibiotic therapy.

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Key words: lung abscess, antibiotic therapy, drainage

Introduction

The incidence of lung abscess has decreased dramatically with the antibiotic era. Most lung abscess cases in pediatric patients are believed to develop secondary to bacterial pneumonia. Other predisposing factors for development of lung abscess include immunodeficiency or immunosuppression states caused by viral infections, severe systemic diseases or steroid therapy and conditions leading to repeated aspiration such as seizure disorders, mental retardation or altered consciousness. Other less common causes of lung abscess are cystic fibrosis, alpha-1 antitrypsin deficiency, anesthesia and dental surgery (1). The gold standard therapy for lung abscess is administration of parenteral antibiotics with anaerobic and staphylococcal coverage (2). Although 85-90% of patients heal without sequela in response to antibiotic therapy, in 10-15% of patients simple drainage or other surgical interventions are mandatory (3).

The patient presented in this paper required computerized tomography (CT) assisted percutaneous drainage in addition to parenteral antibiotherapy. After successful drainage of the abscess, a self-limited fistula formation between the abscess cavity and the bronchus developed as a minor complication which resolved spontaneously.

Case Report

A 2.5 year-old girl was admitted to our hospital with a history of high fever, cough, and malaise. The patient had consulted a

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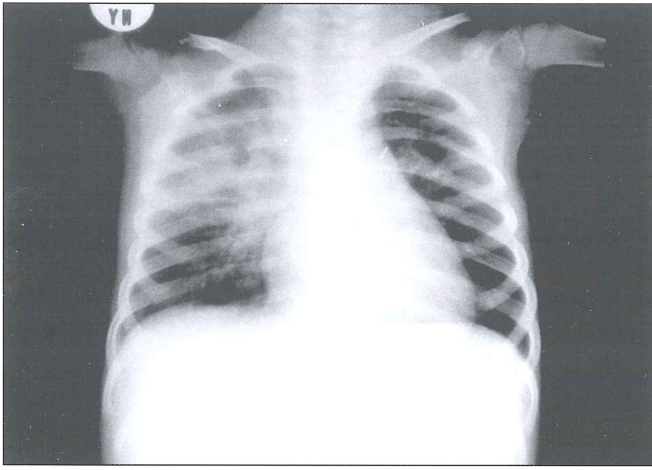


Figure 1. Plain chest radiograph shows right upper lobe consolidation with prominent horizontal fissure. There is linear density on the left hilum due to the patent ductus arteriosus surgery.

private practitioner 6 days prior to admission and diagnosed as upper respiratory tract infection. She was started on an oral antibiotic (cephadroxy 30 mg/kg/day), but her symptoms did not resolve. She was then seen in our outpatient clinic and was admitted with the persistence of her symptoms including high fever. The patient's past medical history was significant for coil-closure of her PDA at 1 year of age. The family history was noncontributory.

Physical examination revealed a well nourished child in mild respiratory distress. She was 13.7 kg in weight (between 50-75th percentiles) and 92 cm in height (between 50-75th percentiles). She had a temperature of 38.5°C, a respiratory rate of 50/minute and a heart rate of 156/minute. Auscultation of the lungs revealed decreased respiratory sounds in the right upper zone. The rest of her physical examination was unremarkable.

On laboratory tests, WBC count was 29 400/mm³ with 70% neutrophils, the erythrocyte sedimentation rate (ESR) was 134 mm/hour, C-reactive protein was 149 ng/mL. A posterior-anterior chest x-ray showed infiltration in the right upper zone consistent with lobar pneumonia (Fig 1). Intravenous cephtriaxone (100mg/kg/day) was started with a diagnosis of right upper zone lobar pneumonia. A repeat chest x-ray taken on the third day of admission because of the persisting high fever revealed a cavity formation and air-fluid level in the right upper zone (Fig 2). Based on these findings, intravenous clindamycin (40mg/kg/day,) for anaerobic microorganisms and teicoplanine (10mg/kg/day) for *Staphylococcus aureus* were added to the current antibiotic regimen. On the 4th day of admission, CT of the chest demonstrated a cavitory lesion with and air fluid level 5x5cm in diameter in the upper right zone, consistent with lung abscess (Fig 3).

In an attempt to rule out other conditions predisposing to lung abscess, immunoglobulin concentrations, alpha-1 antitrypsin

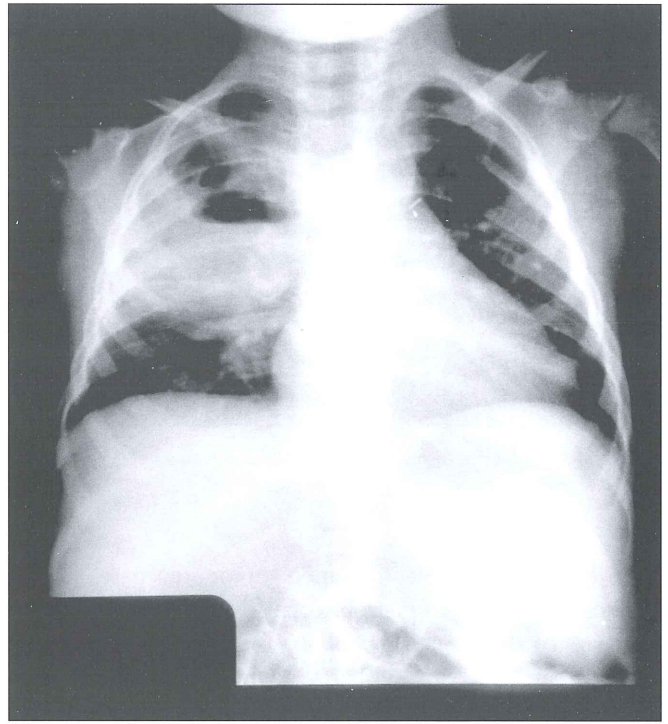


Figure 2. The control chest radiograph demonstrating cavitation and air-fluid level in the abscess.

level were measured and a sweat chloride test were performed which were all in normal ranges. HIV panel and PPD test were also negative. On the 10th day of treatment, WBC count, ESR and C-reactive protein decreased considerably but high fever persisted. In view of the increase in the diameters of abscess cavity noted in the chest x-ray, percutaneous drainage with CT guidance was performed. About 40 ml of purulent material was drained from the abscess cavity. Gram staining of abscess material showed 5-6 neutrophils per high power field but no bacteria or fungi could be detected. The aerobic, anaerobic and mycotic cultures of the abscess material were negative. Because of air leakage due to a fistula formation between the abscess cavity and bronchus, the drainage tube was kept in place for 18 days. On the 18th day of percutaneous drainage, the air leakage healed without a need for further intervention. A control chest x-ray demonstrated prominent drainage of the abscess cavity (Fig 4). Parenteral antibiotic therapy was continued for a total of one month and the patient was discharged with no symptoms.

Discussion

Today, lung abscess is a very rarely encountered infectious condition in children as well as in adults. Without appropriate antibiotherapy, it is highly fatal. Therefore, early diagnosis and prompt initiation of therapy is vital.

Anaerobic microorganisms are the most common etiological agents leading to lung abscess. Among aerobic microorganisms, *Staphylococcus aureus* and Gram-negative bacilli are the most common agents. Fungal and protozoal



Figure 3. Axial thorax CT scan shows thick-walled abscess cavity containing air-fluid level in the right lung.

agents may be seen in immunocompromised patients (1). Although not proven microbiologically, we assumed that in our patient the abscess developed secondary to a bacterial lobar pneumonia, most probably staphylococcal pneumonia.

The golden standard for the treatment of lung abscess is the use of parenteral antibiotics with anaerobic and staphylococcal coverage (2). Most patients (85-90%) respond to antimicrobial therapy and only a minority will require surgical drainage (3). Response to parenteral antibiotics may take up to 7 to 10 days.

Etiological agents in lung abscess patients can be identified by sputum culture, or by culture of material obtained by drainage with bronchoscopy or by transtracheal/ transthoracic (percutaneous) aspiration. Sputum culture is a less reliable test because of contamination with oropharyngeal secretions. Drainage with bronchoscopy is indicated in the pediatric age group only if foreign body aspiration is suspected. Transtracheal aspiration is not a preferred method for pediatric patients. Transthoracic drainage is the most reliable technique among these diagnostic alternatives. The disadvantage of this technique is the difficulty in performing it if the abscess is not localized in the periphery (1). In our patient the abscess was localized in the periphery and therefore on the 10th day of antibiotic therapy, percutaneous drainage under CT guidance was performed. The cultures obtained from the drainage material were negative, probably due to prior antibiotic treatment. Following the drainage, the patient's symptoms, including fever, resolved completely. Although the intervention was not helpful diagnostically, the therapeutic result was gratifying.

CT assisted percutaneous drainage in antibiotherapy unresponsive lung abscess is reported to be a reliable procedure by various authors (4-6). It is used both for treatment and for an attempt to identify the causative organism. Yellin *et al* (4) reported 7 patients who were candidates for operation because of failure with conservative therapy. They were treated successfully with percutaneous tube drainage without any

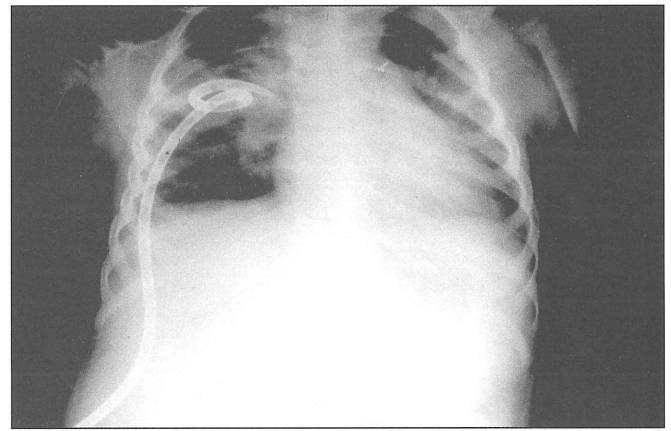


Figure 4. Plain chest radiograph after treatment shows prominent decrease of the abscess cavity size. The drainage catheter in the cavity is seen as well.

relapse up to 2 to 5 years. Rice *et al* (5) published their study on 14 patients treated with percutaneous drainage who had an abscess cavity of more than 4 mL. Weissberg *et al* (6) reported 7 patients with lung abscess in severe sepsis who were candidates for operation because of critical systemic illness. In these patients, tube drainage resulted in prompt clinical recovery and symptoms resolved completely in 4-24 days.

Complications secondary to lung abscess are rare. Mediastinal shift due to massive expansion of lung abscess, pyopneumothorax, spontaneous rupture of lung abscess and dissemination to other lung areas are potential complications. Complications related to surgery and drainage are more common (1). In our case, a fistula developed between the abscess cavity and bronchus, but healed spontaneously on the 18th day of the drainage.

In conclusion, lung abscess is a very rare disease in children which needs to be identified and treated promptly. Parenteral therapy with wide spectrum antibiotics is the gold en standard in treatment. Response to parenteral antibiotics may take 7 to 10 days. Percutaneous drainage is a safe adjuvant to parenteral antibiotic therapy, but should only be reserved for patients who are not responsive to medical treatment.

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