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Foreign Body Aspiration in Children-a Diagnostic Challenge

Slobodanka Petrovic[1], Svetlana Cegar[1], Jovan Lovrenski[1], Nenad Barisic[1], Viktor Till[2]

[1]*Institute for Child and Youth Health Care of Vojvodina, Novi Sad, Serbia*
[2]*Clinical Center of Vojvodina, Institute for Radiology, Novi Sad, Serbia*

ABSTRACT

The clinical presentation of foreign body aspiration in children is variable. Clinicians should maintain a high index of suspicion in order to make a prompt and correct diagnosis. In this paper,we present a case of foreign body aspiration that had gone unrecognized for 54 days. Foreign body aspiration should be considered whenever a previously healthy child suddenly exhibits unexplained symptoms usually consistent with airway obstruction which is refractory to medical treatment.

Key Words: Bronchoscopy, children, foreign body aspiration, prolonged diagnosis

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Introduction

Foreign body aspiration (FBA) is common among children, but sometimes there is a significant delay until the diagnosis is made. A delay of over three days between aspiration and removal of the foreign body (FB) was reported in almost 30% of children (1). The highest incidence of FBA is in children between one to three years of age (2). A recent history of aspiration is elicited in only 73-80% of cases, leaving up to 27% of cases unrecognized. The interval between FBA and admission to hospital may vary between a few days to several months, even years (3, 4). When obtained, anamnestic data revealed symptoms such as coughing, wheezing and/or choking in 95% of cases (5, 6).

The clinical presentation of FBA can mimic other pulmonary diseases, so it is obvious why a significant number of children are misdiagnosed (in up to 18% of cases), most often with pneumonia, persistent fever or asthma which does not respond to standard therapy (5, 7). The aim of this paper was to depict the obstacles that pediatricians and radiologists may face when dealing with a patient with unrecognized FBA.

Case Report

A previously healthy, 11-month old boy was admitted to a local hospital with the diagnosis of acute bronchiolitis and laryngitis. Except for a positive family history of asthma, all other anamnestic data were normal. Standard therapy was initiated and his condition gradually improved. After 4 days, he suddenly developed global respiratory insufficiency, so he was intubated and transported from the local hospital to the Pediatric Intensive Care Unit (PICU) of our hospital. On admission to PICU, he was subfebrile and dyspnoic. Auscultation revealed symmetric low-tone wheezing and early and late inspiratory crackles. CR was normal. Respiratory support (continuous positive airway pressure) was initiated. The patient's condition improved, so he was extubated 16 hours after admission. Two days later, he was transferred to the Pulmonology Department. At that time, he was dyspnoic, $SatO_2$ was 95% with supplemental oxygen through nasal cannulas. He had a laryngeal cough and weakened breathing with inspiratory-expiratory stridor. CR showed paracardial and consolidation of basal parts of left lung (Figure 1A). Bronchodilatators and antibiotics were continued until serological and microbiological tests, along with negative indicators of acute inflammation, ruled out bacterial and viral etiology. Auscultatory findings improved, but mild wheezing persisted. Five days after cessation of antibiotics he was febrile again, reaching 40°C. The CR finding stimulated (Figure 1B) raised suspicions of bacterial infection of the lower airways. Antibiotics were included in the therapy and after 24 hours he became afebrile.

Despite the continuous use of bronchodilatators, signs of bronchoobstruction persisted. He had a positive family history for asthma, so inhaled corticosteroids were added to the therapy but had no significant effect. Additional examinations (cardiologist, gastroenterologist, fluoroscopy of upper gastrointestinal tract, sweat chlorine, allergological tests as well as mycobacterium tuberculosis tests) ruled out other possible causes of symptoms. Poor clinical response and unclear clinical condition were indications for bronchoscopy, which was performed on the 45th day of hospitalization (This option was considered earlier, but when it was suggested, the mother

Address for Correspondence: *Dr. Slobodanka Petrovic, Institute for Child and Youth Health Care of Vojvodina, Novi Sad, Serbia*
Phone: + 381 64 2115233 E-posta: bakiboy@sezampro.rs

had refused to give consent for the procedure). Bronchoscopy revealed complete obstruction of the left main bronchus with a soft tissue mass. After partial extraction of the mass, inflammation and granulomatous changes of mucosa were observed at the posterior wall of the proximal part of the bronchus. The procedure was ended because of the hemorrhage and possibility of complications. Two days later, contrast enhanced computed tomography (CECT) was performed using 2.5 mm section thickness and 0.6 mm reconstruction interval for multiplanar reformatted (MPR) imaging (Figure 2).

After 7 days of intravenous corticosteroid therapy, bronchoscopy findings were improved. A mucus plug with detritus was extracted at 5 mm distance below the bifurcation. FB was visualized and removed. It was a semioval shaped piece of plastic, 10x3 mm in size, with partially sharp edges on the 54th day of hospitalization. Complete regression of all respiratory symptoms followed.

Discussion

The most important criteria to raise a suspicion to FBA are anamnestic data. They are elicited in 70-80 % of cases, meaning that such data are absent in up to 27% of patients (3, 4, 6, 8). In such cases, the interval between inhalation and admission to the hospital may vary between few days to several months or years (4). Delays attributable to patients' behavior or circumstances are most common in young children when the FBA event was unwitnessed (3). In our case, there was no anamnestic data pointing to FBA. The symptoms that appeared first-laryngeal cough, hoarseness and dyspnea, were indicative of upper airway infection. Acute respiratory failure and global respiratory insufficiency probably developed due to positioning of the foreign body in the laryngeal region. During emergency intubation, FB was pushed further into the distal parts of the airways, which was the cause of inspiratory-expiratory and, later on, constant wheezing. Furthermore, misleading information such are the atopic status of the patient and poor social background, raised suspicions of diseases with similar presentation.

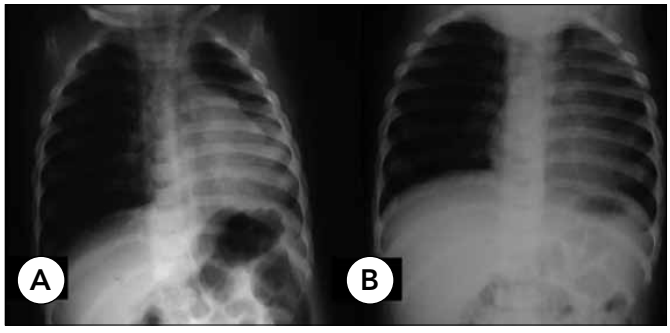

Figure 1. A) Paracardial and basal opacities of the left lung. B) Asymmetric lung volumes with hyperinflated and hyperlucent right lung

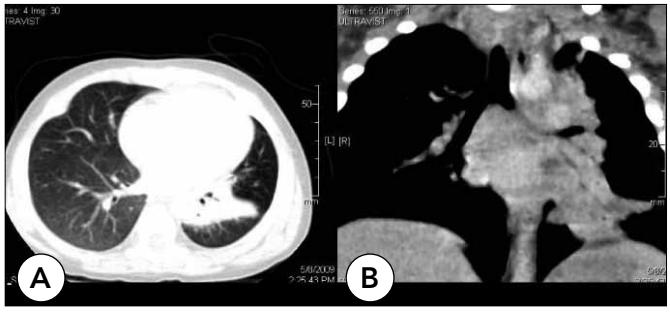

Figure 2. A) Axial CECT images show lung consolidation on the left with visible bronchogram, along with loss of volume on the same side, combined with segmental hyperinflation. B) Coronal MPR show 23mm long hypodense content within the left main bronchus, starting 5mm below bifurcation, and entering the proximal part of the lobar bronchus. It had an appearance of a mucus plug

When FBA is suspected, CR is requested. Normal CR does not rule out FB aspiration. In children younger than 3 years of age, in 80% of cases FBs are not visible on CR (8). Findings on CR can reveal secondary changes in the associated lung or pulmonary lobe as obstructive emphysema or overinflation of the lung or lobe distal to the airway obstruction. In our case, CR was not very helpful. CT can be used in all doubtful cases to determine bronchiectasis or other conditions, and is proved to be better than CR in depicting radiolucent FBs which far outnumber radiopaque ones (9, 10). Following the contemporary approach to pediatric radiology, based on the ionizing radiation reduction because of its harmful effects, we used CT as the last diagnostic choice (11-15). Although some studies demonstrated the efficiency of virtual bronchoscopy (16), it is a time consuming procedure which, in our experience, does not provide additional information to MPR imaging. A similar opinion was stated in the study of Kocaoglu et al. (17) but, even a CT examination did not allow the final diagnosis to be made. The most striking feature was the complete discrepancy between CR and CT findings after the first bronchoscopy, which occurred within only two days. Although, in those two days, left bronchus occlusion probably prograded, the most probable reason for such discrepancy was the retrocardial position of lung consolidation, so it was superimposed on the cardiac silhouette on CR.

Radiological findings should not influence the decision about treatment and should not delay bronchoscopy in children with a suspicion of aspiration (3, 18). Because complications such as pneumonia, granulation tissue formation, and bronchiectasis increase if the diagnosis is delayed, early bronchoscopy is preferred. Unfortunately, in our case, bronchoscopy was delayed due to administrative reasons (initially the mother refused to give consent for the procedure). Further, when bronchoscopy was performed for the first time, complete occlusion of the left bronchus, hemorrhage and high risk of serious complications (e.g. perforation) prevented a final diagnosis. During that time, the left bronchus was occluded by granulation tissue, but the nature of the foreign body (plastic) did not allow fixation of FB to the wall of bronchus. Finally, that enabled the bronchoscopic approach to the FB and extraction after a course of corticosteroid therapy.

Prompt and accurate diagnosis of FBA can be achieved with early bronchoscopy, which is essential for reducing associated morbidity and mortality.

Conflict of Interest

No conflict of interest was declared by the authors.

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