

## Foreign body aspiration in children - a diagnostic challenge

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### **Abstract**

Clinical presentation of foreign body aspiration in children is variable. Clinicians should maintain high index of suspicion in order to make 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 refractory to medical treatment.

**Key words:** bronchoscopy, children, foreign body aspiration, prolonged diagnosis

## 26 **Introduction**

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

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

## 40 **Case report**

41 Previously healthy, 11-months old boy was admitted in local hospital with the  
42 diagnosis of acute bronchiolitis and laryngitis. Except positive family history of asthma,  
43 all other anamnestic data were normal. Standard therapy has been initiated and his  
44 condition gradually improved. After 4 days, he suddenly developed global respiratory  
45 insufficiency, so he was intubated and transported from local hospital to the Pediatric  
46 Intensive Care Unit (PICU) in our hospital. On admission in PICU, he was subfebrile and  
47 dyspnoic. Auscultation revealed symmetric low-tone wheezing and early and late  
48 inspiratory crackles. CR was normal. Respiratory support (continuous positive airway  
49 pressure) was initiated. Patient's status improved, so he was extubated 16 hours after  
50 admission. Two days latter he was transferred to the Pulmonology Department. At that

51 time, he was dyspnoic, SatO<sub>2</sub> was 95% with supplemental oxygen through nasal  
52 cannulas. He had laryngeal cough and weakened breathing with inspiratory-expiratory  
53 stridor. CR showed paracardial and consolidation of basal parts of left lung (Figure 1-A).  
54 Bronchodilators and antibiotics were continued until serological and microbiological  
55 tests, along with negative indicators of acute inflammation, ruled out bacterial and viral  
56 etiology. Auscultatory findings improved, but mild wheezing persisted. Five days after  
57 cessation of antibiotics he was febrile again, reaching 40°C. CR finding aggravated  
58 (Figure 1-B) raising suspicions to bacterial infection of lower airways. Antibiotics were  
59 included in the therapy and after 24 hours he became afebrile.

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### **Figure 1.**

61 Despite the continuous use of bronchodilators, signs of bronchoopstruction  
62 persisted. He had positive family history for asthma, so inhaled corticosteroids were  
63 added to the therapy but had no significant effect. Additional examinations (cardiologist,  
64 gastroenterologist, fluoroscopy of upper gastrointestinal tract, sweat chloride,  
65 allergological tests as well as mycobacterium tuberculosis tests) ruled out other possible  
66 causes of symptoms. Poor clinical response and unclear clinical status were indication for  
67 bronchoscopy, which was performed at 45<sup>th</sup> day of hospitalization. (This option was  
68 considered earlier, but when it was suggested, mother refused to give consent for the  
69 procedure). Bronchoscopy revealed complete obstruction of the left main bronchus with  
70 soft tissue mass. After partial extraction of the mass, inflammation and granulomatous  
71 changes of mucosa were observed at the posterior wall of the proximal part of the  
72 bronchus. The procedure was ceased because of the hemorrhage and possibility of  
73 complications. Two days later, contrast enhanced computed tomography (CECT) was  
74 performed using 2.5 mm section thickness and 0.6 mm reconstruction interval for  
75 multiplanar reformatted (MPR) imaging (Figure 2).

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**Figure 2.**

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After 7 days of intravenous corticosteroid therapy, bronchoscopy findings were improved. A mucus plug with detritus has been extracted at 5 mm distance below the bifurcation. FB was visualized and removed. It was semioval shaped piece of plastic, 10 x 3 mm in size, with partially sharp edges. That was at 54<sup>th</sup> day of hospitalization. Complete regression of all respiratory symptoms followed.

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**Discussion**

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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.<sup>(3,4,6,8)</sup> In such cases, interval between inhalation and admission to the hospital may vary between few days to several months or years.<sup>(4)</sup> Delays attributable to patients' behavior or circumstances are most common in young children when FBA event was unwitnessed.<sup>(3)</sup> In our case, there was not any anamnestic data pointing to FBA. The symptoms that appeared first - laryngeal cough, hoarseness and dyspnea, were indicative for upper airway infection. Acute respiratory failure and global respiratory insufficiency probably developed due to positioning of the foreign body in laryngeal region. During emergency intubation FB was pushed further into the distal parts of airways, what was the cause of inspiratory-expiratory and, later on, constant wheezing. Furthermore, misleading information such are atopic status of the patient and poor social background, raised suspicions to diseases with similar presentation.

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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.<sup>(8)</sup> Findings on CR can reveal secondary changes in associated lung or pulmonary lobe as obstructive emphysema or overinflation of the lung or lobe distal to the airway obstruction. In our case, CR has not been very helpful. CT can be used in all unclear

101 cases to determine bronchiectasis or other conditions, and is proved to be better than CR  
102 in depicting radiolucent FBs which far outnumber radiopaque ones.<sup>(9,10)</sup> Following the  
103 contemporary approach to pediatric radiology, based on the ionizing radiation reduction  
104 because of its harmful effects, we used CT as last diagnostic choice.<sup>(11-15)</sup> Although some  
105 studies demonstrated the efficiency of virtual bronchoscopy,<sup>(16)</sup> it is time consuming  
106 procedure which, in our experience, does not provide additional information over MPR  
107 imaging. Similar opinion was stated in the study of Kocaoglu et al.<sup>(17)</sup> But, even a CT  
108 examination hasn't brought us to the final diagnosis. The most striking was a complete  
109 discrepancy between CR and CT findings after the first bronchoscopy, which aroused  
110 within only two days. Although, in those two days, left bronchus occlusion probably  
111 prograded, most probable reason for such discrepancy was retrocardial position of lung  
112 consolidation, so it was superimposed with cardiac silhouette on CR.

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

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

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170 **Figure legends:**

171 **Figure 1.** A) Paracardial and basal opacities of left lung. B) Asymmetric lungs' volumes  
172 with hyperinflated and hyperlucent right lung

173 **Figure 2.** A) Axial CECT images show lung consolidation on the left with visible  
174 bronchogram, along with loss of volume at the same side, combined with segmental  
175 hyperinflation. B) Coronal MPR show 23mm long hypodense content within left main

- 176 bronchus, starting 5mm below bifurcation, and entering the proximal part of the lobar
- 177 bronchus. It had an appearance of the mucus plug.