

Case Report**AN UNUSUAL CASE OF FOREIGN BODY ASPIRATION IN 6-YEAR-OLD BOY**Svitlana Ilchenko^{1*}, Anastasiia Fialkovska¹, Serhii Shchudro²

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Received: 03-02-2021; Accepted: 03-14-2021; Published: 03-18-2021.

Abstract: Foreign body aspiration (FBA) is a common cause of mortality and morbidity in children. FBA is not always immediately diagnosed, partly because this diagnosis is not frequently in mind, but also because FBA does not have a specific clinical manifestation. FBA can be misdiagnosed as asthma, upper respiratory tract infection, pneumonia, or croup. Sometimes, FBA can be completely asymptomatic. We present the case with a delay in diagnosing FBA and discuss the appropriate management of suspected foreign body aspiration in a 6-year-old boy. This case illustrates the need for prompt action and a high level of suspicion in patients with prolonged symptoms and no resolution with standard treatment. Diagnosis should always be based on a combination of data obtained from the clinical history, physical examination, and radiographic findings. However, the normal appearance of a chest X-ray does not exclude the possibility of FBA.

Keywords: Foreign bodies aspiration, children

INTRODUCTION Foreign body aspiration (FBA) is a common cause of mortality and morbidity in children. Before the 20th century, FBA had a 24 percent mortality rate [1]. With the development of modern bronchoscopy techniques, mortality has fallen dramatically [2]. According to the National Safety Council, in 2016, the rate of fatal choking in American children <5 years of age in the general population was 0.43 per 100,000. Males accounted for 55.4% of cases, but there was no statistically significant difference between the sexes [3].

Young children are particularly at risk for foreign body aspiration. One study has shown the mean age to be 24 months, with 98% of cases involving children < 5 of age [4]. As airway resistance is inversely related to the cross-sectional radius by a power of four, the relatively smaller diameter of pediatric airways means that they are more prone to significant airflow obstruction with even small foreign bodies [5]. Most frequently, aspirated objects are food, which is involved in 75% of the cases; other organic materials, such as bones, teeth, and plants 7%, nonorganic materials such as metals and plastics 13%, rocks 1%, and

toys or parts of toys 1%. [6]. Due to the relative anatomical narrowing of the tracheobronchial tree in children, the proximal airway is typically the obstruction site. In fact, in one retrospective review, 96% of foreign bodies aspirated were found in this location [4]. In children <15 years of age, foreign bodies lodge within the left lung almost as often as in the right lung. This is due to the symmetric tracheal take-off angle found between the two bronchi in many children prior to developing a prominent aortic indent affecting the trachea and left main bronchus [7].

Diagnosis of FBA is still a challenge. Presenting symptoms for a foreign body's aspiration may be nonspecific and can include coughing, wheezing, shortness of breath, and fever. Eliciting a careful history of an episode of choking, especially one associated with sudden onset of cough or shortness of breath, may prove important in not missing the diagnosis. Often the initial event lasts only for seconds to minutes and is followed by a period of no symptoms, misinterpreted as a resolution by the child or family. The re-emergence of cough or wheeze symptoms or dyspnea can often be interpreted as acute pneumonia, asthma exacerbation, bronchiolitis, or croup [8]. Findings on chest radiograph in foreign body aspiration include hyperinflation, obstructive emphysema, atelectasis, and infiltrates; 31 % may be normal. Most foreign bodies are

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organic and radiolucent; 8%-23.5 % are radiopaque and may be seen on chest radiograph [9].

A delayed diagnosis (> 24hours) of FBA is associated with an increased incidence of complications [10]. The complications of FBA can be divided into two groups: complications related to the foreign body itself and complications following the bronchoscopic procedure. The severity of foreign body aspiration complications depends on the aspirated object's size, shape, composition, location, and orientation. Foreign body aspiration and its evolution can lead to complications such as pneumomediastinum, bronchial stenosis, pneumothorax, hydropneumothorax, abscess, atelectasis, pneumonia, bronchiectasis, foreign body dislodgment, and bronchospasm. The presence of these complications in children is about 22% to 33%, and the most common is pneumonia [11]. Bronchial stenosis is also a well-known complication of chronic foreign bodies in the airway. Obstructive emphysema was the most common complication for foreign bodies discovered >3 days after the initial event [12]. Furthermore, the patient can develop complications resulting from the bronchoscopy. Usually, the foreign body is successfully removed with bronchoscopy simply and safely. However, complications may occur in 6% to 8 % of the procedures. They can be significant ones, such as pneumomediastinum, trachea laceration, vocal cords laceration, sub-glottic edema, and a necessity for thoracotomy, bronchotomy, or lobectomy [11].

CASE PRESENTATION A 6-year-old boy presented with a complaint of cough and whistling sound on expiration and while speaking for the past 2 weeks, which was not associated with fever or runny nose. According to the information of his mother, the boy was healthy about two weeks ago. His previous medical history was unremarkable and negative, specifically for asthma, allergies, or recurrent infections. There were no environmental exposures. His symptoms began after visiting the dentist for a deciduous tooth extraction, but he did not develop choking episodes and cyanotic spells. He had a persistent dry cough during the day and night that was occasionally productive. For these complaints, he visited the family's doctor and was diagnosed with bronchitis. Blood test results were without inflammatory changes. A chest X-ray was reported as normal, without identifying atelectasis or the aspirated object. The patient was prescribed bronchodilators, inhaled glucocorticosteroids, and unspecified antibiotics. Symptoms decreased but

remained with pre-dominantly nonproductive night cough accompanied by audible wheezing at a distance.

On physical examination, the child was in moderate respiratory distress. Consciousness was clear. His respiratory rate was 28/min; heart rate was 95/min; body temperature was normal. Oxygen saturation was 96 % on room air. Skin and visible mucous membranes were pale. Peripheral lymph nodes were not enlarged.

Chest examination revealed normal external morphology and complete respiratory movements in amplitude and frequency. Upon auscultation, wheezing was described as both inspiratory and expiratory, which was audible without a stethoscope. The percussion sounds above the lungs were resonant. Other systemic examination revealed no abnormality. To exclude a foreign body, rigid bronchoscopy was done under general anesthesia. The upper airway and trachea were normal; a foreign body (a part of the deciduous tooth) was found occluding the left principal bronchus (Figure 1).



Figure 1. The aspirated part of the deciduous tooth removed by rigid bronchoscopy from the left principal bronchus.

There was hyperemia of the mucous membrane because of the airway inflammation as well as granulation tissue around its edges, suggesting that it had been there for

some time. The foreign body was removed with difficulty, and the patient had a pneumothorax. He was admitted to the pediatric intensive care unit and observed there for 48 hours. After one week follow up, he was well and had no respiratory signs and symptoms.

DISCUSSION Foreign body aspiration (FBA) is a common cause of morbidity and mortality in young children. Early diagnosis and treatment are imperative to prevent mortality and serious complications. However, FBA is not always immediately diagnosed, partly because this diagnosis is not frequently in mind, but also because FBA does not have a specific clinical manifestation. In many children, the initial choking events are often not witnessed, and residual symptoms may mimic other common airway conditions. FBA can be misdiagnosed as asthma, upper respiratory tract infection, pneumonia, or croup. Sometimes, FBA can be completely asymptomatic, and the chest radiograph findings are frequently normal or display abnormalities uncharacteristic.

Diagnosis should always be based on a combination of data obtained from the clinical history, physical examination, and radiographic findings, always maintaining a high level of clinical suspicion. However, the normal appearance of a chest X-ray does not exclude the possibility of FBA. Correct medical history is crucial for the correct diagnosis of FBA, and lack of medical history may lead to negligence or the misdiagnosis of FBA. FBA should be suspected in all children with respiratory symptoms such as coughing and wheezing, who do not respond to conventional therapy against pneumonia or upper airway infections. Delay in the diagnosis of foreign body aspiration, which is usually accompanied by misdiagnosis (such as asthma, bronchitis, pneumonia, croup, etc.), increases the symptomatic period, the rate of complications, and complicates diagnosis and subsequent treatment. When FBA is suspected, the child should be sent to a hospital immediately.

Flexible bronchoscopy may be used in cases of potential foreign body aspiration when the diagnosis is sufficiently unclear. Flexible bronchoscopy allows a complete airway evaluation to find potential foreign bodies. If there is no foreign body, then a complete examination and bronchoalveolar lavage will help determine the cause of the respiratory symptoms. In only very limited cases with experienced bronchoscopists should foreign body removal be attempted with flexible bronchoscopy. The flexible instrument was not designed for object removal, and grasping foreign bodies with forceps out the end of

a broncho-scope could easily lead to dislodgement of the object and acute airway obstruction. When foreign body aspiration is highly suspected, rigid bronchoscopy is the procedure of choice [13].

Disclosure:

The author declares no conflicts of interest.

REFERENCES

1. Ruiz FE. Airway foreign bodies in children. Available at <http://www.uptodate.com/contents/airway-foreign-bodies-in-children>. Accessed February 21, 2020.
2. Aggarwal A. and Kaur H. 2019. Bronchoscopy: foreign body aspiration: a case report. *International Journal of Current Research*. 11, (12), 8735-8737. doi: <https://doi.org/10.24941/ijcr.37377.12.2019>.
3. Cramer N, Jabbour N, Tavarez MM, et al. Foreign Body Aspiration. [Updated 2020 Aug 23]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK531480/>.
4. Even L, Lea E, Heno N, Nawaf H, Talmon Y, Yoav T, Samet E, Elvin S, Zonis Z, Ze'ev Z, Kugelman A, Amir K. Diagnostic evaluation of foreign body aspiration in children: a prospective study. *J Pediatr Surg*. 2005 Jul;40(7):1122-7. doi: 10.1016/j.jpedsurg.2005.03.049.
5. Harless J, Ramaiah R, Bhananker SM. Pediatric airway management. *Int J Crit Illn Inj Sci*. 2014;4(1):65-70. doi:10.4103/2229-5151.128015.
6. Roy K, Amin SK, Setu M, Khondaker T, Chowdhury NS. An Unusual Case of Foreign Body Aspiration: A Case Report. *AKMMC J*. 2015;6(2):47-9. DOI: 10.3329/akmmcj.v6i2.31593.
7. Cleveland RH. Symmetry of bronchial angles in children. *Radiology*. 1979 Oct;133(1):89-93.
8. Daines CL, Wood RE, Boesch RP. Foreign body aspiration: an important etiology of respiratory symptoms in children. *J Allergy Clin Immunol*. 2008 May;121(5):1297-8. doi: 10.1016/j.jaci.2008.03.014. PMID: 18466789.
9. Samprathi M, Acharya S, Biswal B, Panda SS, Das RR. An Unusual Foreign Body Masquerading as Pneumonia. *J Pediatr*. 2016 Nov; 178:300-300.e1. doi: 10.1016/j.jpeds.2016.07.026. Epub 2016 Aug 12. PMID: 27526620.
10. Mallick MS. Tracheobronchial foreign body aspiration in children: A continuing diagnostic challenge. *Afr J Paediatr Surg*. 2014 Jul-Sep;11(3):225-8. doi: 10.4103/0189-6725.137330. PMID: 25047313.

11. Oliveira CF, Almeida JF, Troster EJ, Vaz FA. Complications of tracheobronchial foreign body aspiration in children: report of 5 cases and review of the literature. *Rev Hosp Clin Fac Med Sao Paulo*. 2002;57(3):108–11. doi: <http://dx.doi.org/10.1590/S0041-87812002000300005>.
12. Foltran F, Ballali S, Rodriguez H, Sebastian van As AB, Passali D, Gulati A, Gregori D. Inhaled foreign bodies in children: a global perspective on their epidemiological, clinical, and preventive aspects. *Pediatr Pulmonol*. 2013 Apr;48(4):344-51.
13. Daines CL, Wood RE, Boesch RP: Foreign body aspiration: An important etiology of respiratory symptoms in children. *J Allergy Clin Immunol*. 2008, 121 (5): 1297-1298. doi: 10.1016/j.jaci.2008.03.014.