

CLINICAL CASE

Delayed diagnosis of foreign body aspiration

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ABSTRACT

Background. Aspiration of foreign bodies in the central airway is a common problem in the pediatric population, representing a major cause of morbidity and mortality in our country. In the U.S., foreign body aspiration is the cause for 7% of accidental deaths in children between 1 and 3 years of age. Clinical diagnosis requires a high degree of suspicion in the medical history especially when the choking event is unclear in the clinical history because physical examination and radiological findings have a low sensitivity.

Case report. We present the case of a 14-year-old male with a history of foreign body aspiration. The patient's symptoms were given little importance. A 1-year delay in diagnosis occurred due to symptoms mimicking other pathologies. The patient was referred to the Pediatric Pulmonology Unit "Fernando Katz" of the National Institute of Respiratory Diseases where bronchoscopic exploration was performed with removal of foreign body (plastic object) from the intermediary bronchus.

Conclusions. Delayed diagnosis causes respiratory problems ranging from life-threatening airway obstruction to chronic respiratory symptoms such as wheezing and recurrent respiratory infections. It has been shown that these symptoms can be confused with other pathologies such as asthma.

Key words: foreign body aspiration, children, bronchoscopy, delayed diagnosis.

INTRODUCTION

The entry of a foreign body to any part of the bronchial tree causes serious clinical changes to the patient, regardless of age.¹ Children are at much greater risk than adults. This increased risk is related to the introduction of solids to the diet and the curious nature of the child who tends to put objects into the mouth. In a series of 200 Brazilian children who aspirated some type of foreign body, it was found that 75% of accidents occurred at home and that in 40% of the cases the parents were not aware of the episode.² Most objects aspirated are of an organic nature where peanuts predominate, although

it has also been reported that sunflower seeds may be the main cause. However, the varieties of the types of foreign bodies aspirated in different series depend on the social, economic and cultural conditions.³ Plastics, which are the main objects that children put in their mouths, are not surprisingly the most common causes of aspiration in developing countries, but are <10% in developed countries.

Case Report

A 14-year-old male from the State of Mexico, was referred to the Pediatric Pulmonology Unit Fernando Katz of the National Institute of Respiratory Diseases (INER) with the diagnosis of recurrent respiratory infections. The patient belongs to a family with a low socioeconomic status. There is no relevant past medical history. He began his condition a year before admission to the INER while playing with a piece of plastic (~1 cm in length) with his mouth and had a sudden event of breathing difficulty with cyanosis and coughing fits, which resolved on its own. Twenty-four hours after the event he showed an unquantified increase in temperature and productive cough and for this reason went for a physician consultation where a diagnosis of acute bronchitis was wrongly established and the pa-

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tient was prescribed cough suppressants and unspecified antibiotics. Symptoms decreased but remained with predominantly productive morning cough accompanied by audible wheezing at a distance and intermittent increased temperature. The patient was evaluated by several physicians and underwent chest x-ray studies, which were reported as normal, without identifying atelectasis or the aspirated object. Until then he had received multiple therapies, primarily with cough suppressants, mucolytics, bronchodilators and antibiotics.

The patient arrived at the INER in good general condition with adequate color and hydration and no evidence of increased breathing exertion. Chest examination revealed normal external morphology and complete respiratory movements in amplitude and frequency. Upon auscultation, mild bilateral wheezing and decreased breath sounds were detected at the lower third of the right hemithorax, clear to percussion, bilaterally symmetrical and without pleuropulmonary syndrome. The remainder of the examination was normal. Posteroanterior chest x-ray with digital technology was without observable changes in soft tissue or bone; air column shifted slightly to the right with the presence of radiopacity located at the level of the middle lobe and signs of the silhouette with cardiac imaging (Figure 1).

Spirometry was reported within normal limits for the patient's age without response to bronchodilator.

The patient was admitted with the diagnosis of recurrent infections with high suspicion of foreign body aspiration. For this reason, it was decided to perform a diagnostic bronchoscopic examination, which was performed under general anesthesia via laryngeal mask with the IT 180 Olympus video bronchoscope. There was a piece of plastic (~1.5 cm in length) housed in the mucosa of the intermediate bronchus accompanied by abundant secretions of thick green inflammatory reaction in the bronchial wall (Figure 2). Foreign body was removed with mouse-tooth forceps for foreign bodies without complications, in addition to samples of secretions for microbiological culture.

The patient progressed satisfactorily with only persistent middle lobe atelectasis, which resolved with respiratory therapy management. One month later the patient was asymptomatic and with chest x-ray within normal parameters. He was scheduled for a follow-up computerized tomography (CT) and bronchoscopy.

DISCUSSION

Diagnosis of aspiration of foreign body may be difficult due to the lack of history or signs of aspiration, both because a parent was not present when it happened and



Figure 1. Chest imaging in posteroanterior projection without observable changes in soft tissue or bone; air column slightly shifted to the right with the presence of radiopacity located at the level of the middle lobe and cardiac silhouette.



Figure 2. Bronchoscopy. Plastic piece is seen lodged in the mucosa of the intermediate bronchus accompanied by abundant secretions of thick green inflammatory reaction in the bronchial wall.

because the signs may have been very subtle; therefore, it requires a high index of suspicion for the physician to establish the possibility of the diagnosis.³⁻⁵ In a recent study, Kiyan et al. included 207 pediatric patients during a 5-year period. Foreign bodies were located in the airways of 153 of these patients, after excluding those who did not show radiopaque foreign body on x-ray. The percentage of positive bronchoscopy was 71.8%.³ The decision to perform a bronchoscopic study in these patients was based on four characteristics: positive clinical history, symptoms, physical examination and radiological findings. With regard to clinical history, it was considered positive if the family had witnessed the aspiration event; however, the most common finding in the clinical file was the history of paroxysmal cough and cyanosis, which resolved spontaneously. Sensitivity for this clinical history was 90.5% in this series, with a low specificity of 24.1%. The most common symptoms were wheezing and dry cough, whereas the most common symptom presented during physical examination was decreased breath sounds and unilateral wheezing. Radiologic studies are considered the main tool in the patient without a positive clinical history. In this series positive data were found such as unilateral or localized hyperlucency, atelectasis and pneumonic consolidation in 71.7% of patients with positive bronchoscopy. These authors concluded that a history of foreign body aspiration and suggestive symptoms give a high diagnostic sensitivity, although with an intermediate specificity.³ Despite this, clinical and radiological data are not specific enough and may be present in processes that simulate the aspiration of a foreign body or absent in some positive cases.⁶

Girardi et al. found normal x-rays in as high as 47% of patients with foreign body aspiration.⁷ Due to the risk of underdiagnosis of foreign body aspiration, even when there is the slightest suspicion or doubt about the possibility of a foreign body lodged in the airways, a diagnostic or therapeutic bronchoscopy should be performed as appropriate. Several authors believe that it is preferable to have a negative bronchoscopy than to leave a foreign body lodged in the patient's airway.^{3-6,8,9}

It is indicated that a bronchoscopic study be done in patients with suspected foreign body aspiration with rigid bronchoscopy, mainly because this procedure allows maintaining constant pulmonary ventilation;^{4,8} however, several authors recently published a report on the usefulness of

flexible bronchoscopy in the extraction of foreign bodies. In a study that included eight patients with foreign body aspiration over a period of 10 months, Flores et al. were able to extract foreign bodies in six cases using a 6.3-mm flexible bronchoscope. Two patients required the use of a rigid bronchoscope. These authors conclude that both procedures are complementary.⁹ Various centers recommend starting the exploration with the flexible bronchoscope and the extraction with the rigid bronchoscope.

Cohen et al. attempted to define criteria for performing bronchoscopy in pediatric patients with suspected foreign body aspiration. To do this, they included 142 children from 3 months to 14 years of age. They concluded that diagnostic bronchoscopy is indicated for all patients with a positive history of foreign body aspiration, for patients without a clear history but with positive physical examination or the presence of radiological abnormalities, and even for those patients with no clinical history, negative physical examination, without radiological findings but with persistent symptoms such as coughing, wheezing, dysphagia, and intermittent fever insufficiently explained by another cause. These authors proposed a simple "decision tree" in the patient with suspected foreign body aspiration based on the results of their study (Figure 3).⁸

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. In some pediatric series the diagnosis has been made up to 7 days after the event in 16 to 69% of patients.¹³ Karakoc et al. studied the phenomenon of delayed diagnosis in a 7-year period in which a total of 654 bronchoscopies were performed and foreign bodies were identified in only 32 cases (4.8%) These authors found that up to 50% of patients with positive bronchoscopy had at least 3 months of disease at diagnosis. The longest time period that a patient experienced was 11 years. Based on their findings the phenomenon was defined as "when the patient is diagnosed after 3 months of the event."⁵

Among the reasons mentioned as causes of delay in diagnosis are parents not believing the child when the child relates the event and denial of the child with respect to the event for fear of being punished.¹⁴ Delay in diagnosis allows the patient to develop an intense inflammatory reaction around the foreign body, which is more common with

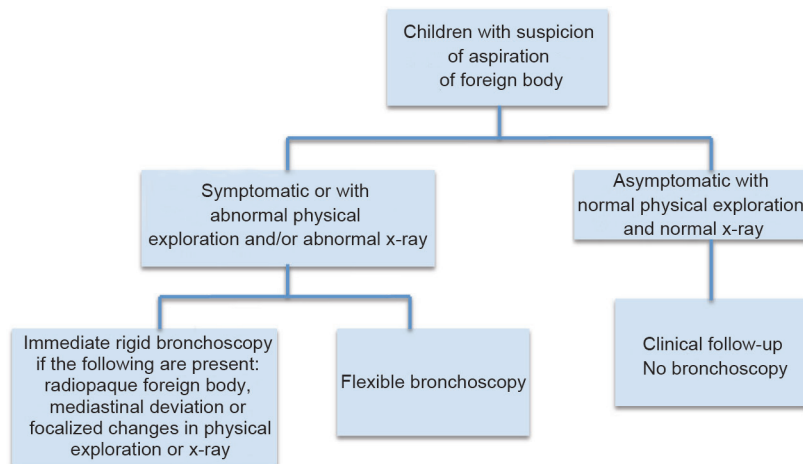


Figure 3. Decision tree for patients with suspected foreign body aspiration. Modified from *J Pediatr* 2009;155:276-280. With permission.

foreign bodies of plant origin. This inflammatory response complicates subsequent removal of the foreign body and increases the risk of complications associated with the procedure.¹ Furthermore, in various series the presence of a foreign body has been associated with airway hyperreactivity or the development of bronchiectasis, which may progress in number and severity and can lead the patient to require a lobectomy as a last therapeutic resort.^{5,7,8}

Aspiration of foreign bodies is a condition that, in children, should be diagnosed and managed early to prevent complications and sequelae. 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. It is also important to interrogate the patient, intentionally searching for clues as to the diagnosis.

According to the above, we conclude that in pediatric patients with symptoms of chronic recurrent respiratory tract symptoms, even in the absence of clinical history, clinical data and positive radiology, the diagnosis of foreign body aspiration should be completely excluded. In the face of minimum suspicion, a diagnostic bronchoscopy should be considered to exclude it with certainty.⁵

REFERENCES

- Lima JAB, Fischer GB. Foreign body aspiration in children. *Paediatr Respir Rev* 2002;3:303-307.
- Bittencourt PFS, Camargos PAM. Aspiração de corpos estranhos. *J Pediatr* 2002;78:9-18.
- Kiyan G, Gocmen B, Tugtepe H, Karakoc F, Dagli E, Dagli TE. Foreign body aspiration in children: the value of diagnostic criteria. *Int J Pediatr Otorhinolaryngol* 2009;73:963-967.
- Cifti AO, Bingöl-Koloğlu M, Senocak ME, Tanyel FC, Büyükpamukçu N. Bronchoscopy for evaluation of foreign body aspiration in children. *J Pediatr Surg* 2003;38:1170-1176.
- Karakoc F, Cakir E, Ersu R, Uyan ZS, Colak B, Karadag B, et al. Late diagnosis of foreign body aspiration in children with chronic respiratory symptoms. *Int J Pediatr Otorhinolaryngol* 2007;71:241-246.
- Sersar SI, Rizk WH, Bilal M, El Diasty MM, Eltantawy A, Abdelhakam BB, et al. Inhaled foreign bodies: presentation, management and value of history and plain chest radiography in delayed presentation. *Otolaryngol Head Neck Surg* 2006;134:92-99.
- Girardi G, Contador AM, Castro-Rodríguez JA. Two new radiological findings to improve the diagnosis of bronchial foreign-body aspiration in children. *Pediatr Pulmonol* 2004;38:261-264.
- Cohen S, Avital A, Godfrey S, Gross M, Kerem E, Springer C. Suspected foreign body inhalation in children: what are the indications for bronchoscopy? *J Pediatr* 2009;155:276-280.
- Daines CL, Wood RE, Boesch RP. Foreign body aspiration: an important etiology of respiratory symptoms in children. *J Allergy Clin Immunol* 2008;121:1297-1298.
- Flores-Hernández SS, García-Torrentera R, Nuñez-Pérez RC. Extracción de cuerpos extraños de la vía aérea en niños mediante broncoscopia flexible. *Rev Inst Nal Enf Resp Mex* 2005;18:103-108.
- Swanson KL, Prakash UB, Midthun DE, Edell ES, Utz JP, McDougall JC, et al. Flexible bronchoscopic management of airway foreign bodies in children. *Chest* 2002;121:1695-1700.
- Martinot A, Closset M, Marquette CH, Hue V, Deschildre A, Ramon P, et al. Indications for flexible versus rigid bronchoscopy in children with suspected foreign-body aspiration. *Am J Respir Crit Care Med* 1997;155:1676-1679.
- Saquiab Mallik M, Rauf Khan A, Al-Bassam A. Late presentation of tracheobronchial foreign body aspiration in children. *J Trop Pediatr* 2005;51:145-148.
- Louie MC, Bradin S. Foreign body ingestion and aspiration. *Pediatr Rev* 2009;30:295-301.