

# A case report of an organic foreign body aspiration in a young child-bridging the gap between anamnestic, clinical and radiological aspects

Mihaela Gutu-Robu<sup>1</sup>, Cristiana Nastac<sup>2</sup>, Simona Mosescu<sup>1</sup>, Mihai Condrat<sup>3</sup>

<sup>1</sup>“Grigore Alexandrescu” Emergency Children’s Hospital, Bucharest, Romania

<sup>2</sup>“Regina Maria” Hospital, Brasov, Romania

<sup>3</sup>Hyperclinica Medlife Unirii, Bucharest, Romania

## ABSTRACT

Foreign body aspiration occurs more frequently in young children due to immature anatomical and functional structures like underdeveloped mechanism of swallowing, weak airway protective reflexes or the absence of molars. We describe the case of a 13-months-old girl who presented for a subsided paroxysmal cough with a sudden onset and intermittent wheezing after eating a piece of walnut. We highlight the importance of a well conducted anamneses and an efficient communication in a multidisciplinary team by describing the way we diagnosed the patient, the therapeutic method used in the removal of the foreign body and the favorable evolution. We analyze the medical literature to check the similarities and differences observed in our case. This could raise awareness among pediatricians about this diagnosis and encourage general practitioners to get involved in educating the parents in Romania.

**Keywords:** foreign body aspiration, children

## Abbreviations

ER – Emergency Room

FBA – foreign body aspiration

FB – foreign body

GERD – Gastroesophageal Reflux Disease

## INTRODUCTION

Foreign body aspiration (FBA) in children is a pediatric emergency frequently diagnosed in young children between the ages of 1 and 3 years old, with a peak incidence seen between 12 and 24 months old [1,2]. The gender distribution describes the condition as being more commonly found in boys [3].

Several predisposing factors are eating food items with a major risk of aspiration, young age with its particularities: immature anatomical and functional structures and specific age-related behaviour like mouthing (an exploratory behaviour observed in infants and toddlers, in which they put items in their mouth for feeling the texture, taste or shape; this action is less commonly seen after 18

months old after they achieve new abilities that allow them to explore the environment in different ways [4,5], stimulation of the gums while teething with different objects and incomplete mastication [6]. The risk persists up to 5-6 years old but may still be present in scholars who play with small objects in their oral cavity [6]. Young children can be easily distracted during the meal, so the foreign body (FB) could be accidentally aspirated while simultaneously eating and playing, sobbing or crying, laughing or running [1,2]. An important cause of aspiration remains the non-compliance or the lack of awareness of the caregivers linked to the recommendation not to offer food items with a high-risk of aspiration [1,2]. Other predisposing factors are listed in table 1.

Corresponding author:

Mihaela Guțu-Robu

E-mail: mihaelaguturobu@gmail.com

Article History:

Received: 22 January 2024

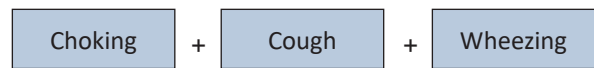
Accepted: 29 March 2024

**TABLE 1.** Predisposing factors in FBA

Factor	Details
Age	< 5 years old
Gender	Boys are more affected than girls because they tend to be more active compared to girls
Behavioural	Mouthing frequently seen before 24 months
	Young children can be easily distracted: playing/crying/laughing/running while eating
Anatomical and functional	Absence of molars which makes chewing difficult and incomplete mastication through early childhood
	Underdeveloped ingestion mechanism
	Neuromuscular immaturity
	Small diameter of the airways
	Cough may be less effecting in dislodging an airway obstruction
Cognitive	The young child's inability to distinguish between edible and non-edible items
Medical history [7]	Gastroesophageal reflux disease
	Malformations of the respiratory or digestive systems
	Dysphagia
	Altered swallowing/cough reflex
	Mental retardation
Educational	Lack of parental education regarding foods with a high risk of aspiration
Cultural	Introduction of solid foods before general recommendations
Diet	Solid foods with a high risk of aspiration/choking: <ul style="list-style-type: none"> <li>- round-shaped foods (blueberries, grapes, sausages, cherry tomatoes, hot dogs, cherries, whole corn kernels, raisins, etc.)</li> <li>- foods with a hard texture: nuts, hazelnuts, sunflower seeds, pumpkin seeds, melon seeds, popcorn</li> <li>- fish bones</li> </ul>

Most often, the aspirated FB have an organic, vegetable origin: peanuts are the most frequently aspirated items followed by sunflower seeds, nuts, watermelon seeds [8]. Commonly identified nonorganic aspirated FB are metallic objects like hairpins or plastic ones like pen caps or body parts of small toys [9].

The clinical classic triad as represented in Figure 1 may not always be present and most often the symptoms observed in the physical examination are highly variable, so establishing the diagnoses could be difficult [9,10]. The anamneses may reveal a paroxysmal episode of cough with cyanosis followed by cough, dyspnoea, stridor, wheeze, food refusal, chest pain, etc [9]. The cough is present in 75-85% of the patients, unlike respiratory distress which is rarely found in FBA [7]. The last one could be associated with dysphonia and stridor when the FB has a laryngotracheal localization [7]. Sometimes the patient could be oligosymptomatic or even present without symptoms. Moreover, it is important to note that the

**FIGURE 1.** Clinical classic triad in FBA

symptomatic periods may alternate with the asymptomatic ones. Imaging studies may not be revealing at the time of the investigation, especially if the foreign body is small and radiolucent. Thus, in the absence of anamnestic criteria and radiological signs, the diagnoses may be difficult for the physician to recognize [11]. Any persistent or recurrent pulmonary symptomatology in a young child should raise the suspicion of FBA [9].

Rigid bronchoscopy with the child placed under general anaesthesia is the method of choice in diagnosing and treating the condition [10]. Some authors consider that in the presence of a suggestive clinical picture, the bronchoscopy should be performed as soon as possible, even in the absence of a clear history or a concluding chest X-ray with direct or indirect aspiration signs.

For a good prognosis and the prevention of severe complications such as: pneumonia, atelectasis, bronchitis, bronchospasm, pneumothorax, dysphagia and pulmonary abscess, prompt intervention is required [3].

## THE CASE PRESENTATION

### Presenting concerns

A 12-month-old girl, localized in a rural area, was brought by her parents to the ER of a Children's Emergency Hospital in Bucharest during the night for an episode of a paroxysmal cough and intermittent wheezing.

From the patient's personal antecedents, we noted that she was exclusively breastfed until baby led weaning was initiated at 6 months old. The child was fully vaccinated according to the National Immunization Program. The medical history revealed Gastroesophageal Reflux Disease with a favourable evolution under treatment and non-Ig E mediated cow's milk protein allergy, for which the mother excluded dairy products from the diet until the child was 12 months old. A week ago, the mother reintroduced the dairy products into her diet without any new signs or symptoms of allergy seen in the child.

The anamnesis revealed that 5 hours before presenting to the ER, she had an episode of paroxysmal cough which lasted for 30 minutes, with a sudden onset, without cyanosis, while she was eating a piece of walnut offered by her mother. The cough spontaneously subsided without any administered treatment. After this unique event, the child had intermittent episodes of wheezing, which ceased on the way to the hospital. We also acknowledged that the child's mother was a paediatrician.

### Clinical findings

The physical examination revealed no pathological changes. Full dentition was present except for molars. We emphasize that cough and wheezing were absent and the pulmonary sounds were symmetrically bilateral, without rales. The saturation of oxygen was 100% without oxygen. Based on the clinical and anamnestic data, a differential diagnosis was made. The absence of signs and symptoms of an infection ruled out a possible lower respiratory tract infection (bronchiolitis or pneumonia). GERD was excluded because the child had no significant symptoms in the last 6 months and satisfactory weight gain. FBA could not be excluded.

### Diagnostic focus and assessment

Chest X-ray (Figure 2) showed no radiological signs of aspiration, saturation monitoring by pulse oximetry showed a blood oxygen saturation of 99-100% without oxygen and the ENT consultation revealed a normal clinical examination. Furthermore, the diagnosis of FBA still could not be excluded because of the positive anamnestic criteria, even if the clinical examination and the paraclinical investigations were normal. A watchful waiting attitude was decided. The mother returned to the ER the next day because she noticed the persistence of wheezing in certain positions and during the meal. She administered bronchodilator on her own initiative with intermittent persistence of wheezing. This time the patient had diminished left basal sounds, without visible respiratory symptoms. Based on the clinical and anamnestic criteria (unilateral pulmonary diminished sounds, the unique episode of paroxysmal cough after eating a high risk of aspiration food item) the patient was admitted in the hospital for the high suspicion of FBA.

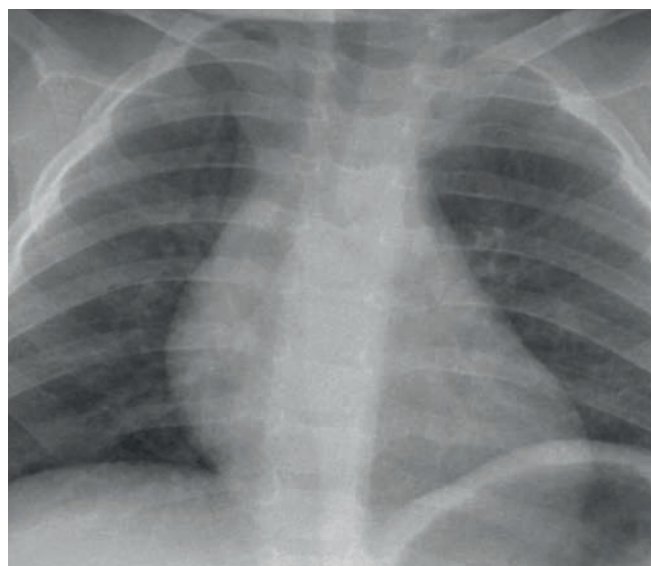


FIGURE 2. Normal chest X-ray

### Therapeutic focus and assessment

Rigid tube bronchoscopy was performed under general anaesthesia the next morning, in less than 72 hours from the main event. A fragment of an organic, vegetable foreign body was removed from the pulmonary lower lobe by the ENT doctor (Figure 3). Prophylactic intravenous antibiotic therapy, intravenous anti-inflammatory steroids and nebulized adrenaline were administered after bronchoscopy.

### Follow-up and monitoring

The patient had a rapid favourable clinical outcome with the remission of wheezing and complete recovery. No complications after bronchoscopy were noted. No long term monitoring was needed.

### CASE PARTICULARITIES

1. The patient presented with poor symptomatology with a normal chest X-ray. Only the anamnesis raised the suspicion of FBA.
2. The FB was in the left lower lobar bronchus and the extraction was difficult due to the small diameter of the lower lobes.
3. The mother offered solid food with high risk of choking, due to being influenced by the well represented dentition, the child's experience in baby-led-weaning and by social media (a detail revealed later in anamnesis), which recommends the parent's trust in the child's abilities without considering whether he is anatomically or functionally able to chew food into small pieces or his medical history.

### DISCUSSIONS

The patient is within the maximum incidence age range for this condition: 12-24 months old [1,9].



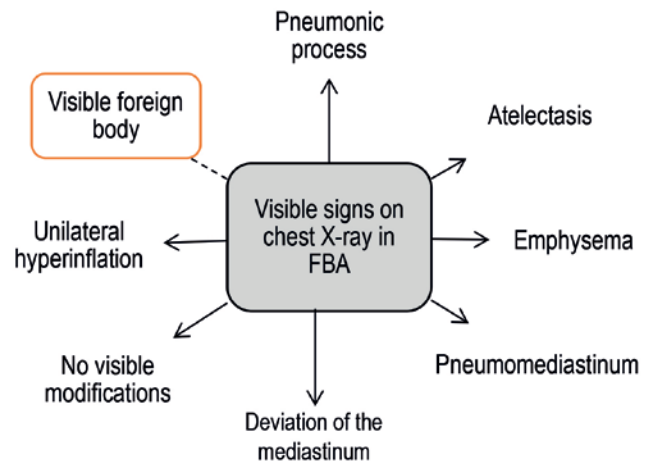
FIGURE 3. Organic, vegetal FB (walnut)

At this age, important predisposing factors are the underdeveloped mechanism of swallowing and the absence of molars. Well represented dentition was a factor that gave confidence to the mother to offer solid food with a high risk of choking. Although existing articles specify a more frequent gender distribution in boys, because they are more active [9],[12], this patient is a girl. The authors are not aware of the existence of a study in which the gender distribution was evaluated when parents did not follow the general recommendation about not offering food with high risk of choking. We can assume that the gender distribution can be equal in this type of patients because it is not dependent on behavioral factors. In our case, the aspiration occurred while the child was being closely watched by a parent, at the table, with food offered by her mother. According to the literature, there is often a history of sudden onset, typically with suffocation, in a child who was playing or crying while eating.

The patient had a paroxysmal cough without cyanosis. The clinical picture lacked the classic clinical triad described in literature, being rather oligosymptomatic with intermittent wheezing alternating with asymptomatic periods. The possibility of a respiratory tract infection was discussed, but the clinical and anamnestic criteria were absent. The patient was fully and correctly vaccinated, in accordance with the Romanian National Vaccination Program, thus whooping cough was excluded. The absence of fever and symptoms such as rhinorrhea and cough ruled out an upper respiratory tract infection. Initially, the examination was normal, noting a symmetrically vesicular murmur in both pulmonary areas and an oxygen saturation in air of 99-100%. In contrast, the literature highlights the presence of wheezing on lung auscultation as an important sign of aspiration and in one study it was documented in more than half of patients diagnosed with aspiration [13]. Also, intrabronchial foreign bodies can manifest with the triad of cough, wheezing and diminished lung sounds in 65% of patients [2]. Therefore, having no clinical findings at the examination, it was not suggestive for the diagnosis, but the suspicion of FBA could not be excluded.

Chest X-ray, performed approximately 6 hours after the episode, did not reveal any specific changes. This has an accuracy between 67-83% in establishing the diagnosis according to some studies and it can reveal volume loss or any of the changes shown in Figure 4 [9]. Chest X-ray performed in the lateral decubitus or during the expiratory phase does not provide a better diagnostic value [7].

A retrospective study conducted over a significant period (of more than 20 years) on a cohort of 132 pediatric patients, mostly under 3 years of age and diagnosed with FBA, suggested that the lack of a



**FIGURE 4.** Possible radiological changes on chest X-ray present in FBA. All of the radiological changes are indirect signs, except the visible FB [12,17]

clear history and the absence of radiological changes may lead to delayed diagnosis [11]. Another factor that can lead to a delay in diagnosis is incorrect case management by the medical staff. Therefore, performing a bronchoscopy when there is a suspicion of this diagnosis, even in the absence of clear anamnestic and radiological criteria was the conclusion drawn by the authors. **In accordance with the recommendations of The American Academy of Pediatrics a bronchoscopy is indicated when the child had an episode of cough or choking and was observed with an item in his oral cavity** [7]. Suspicion of FBA should also be raised in patients with specific symptoms of acute diseases with unfavorable evolution under treatment, for example: a child known to have asthma treated with corticosteroids and bronchodilators or a child diagnosed with pneumonia correctly treated with antibiotics [7].

Persistence of intermittent wheezing after bronchodilator administration was noted in our case. Data from literature show that the absence of response to bronchodilators supports the high suspicion of FBA [14].

Rigid tube bronchoscopy is a safe diagnostic and treatment method that provides good visualization of the FB and allows its extraction [1]. In our case the ENT doctor completely removed the FB from the lower lobar bronchus through rigid tube bronchoscopy in less than 72 hours from the event. Even if the access was difficult due to the small size of the airways, there were no complications afterwards. FB frequently end up in the right main bronchus, which has a larger diameter and a more vertical position, when compared to the left [2,9]. Nuts can be fragmented during the procedure and sometimes re-intervention is necessary after 24-48 hours if total extraction is unsuccessful [1]. Complications of bronchoscopy are: bleeding, pneumothorax, rupture of the tracheobronchial tree and failure to ex-



tract the foreign body [15]. Intraoperative and post-operative complications are more common if the patient is diagnosed after 72 hours from the moment of aspiration [16].

Our case also draws attention to the necessity of primary prophylaxis by educating the parents to avoid foods with a high risk of aspiration and remove small objects that can be accidentally aspirated. With the aid of the medical staff (pediatrician, GP, neonatologist, etc.) or through educational programs, the risk of aspiration is significantly reduced [6,17]. The involvement of doctors is also recommended by other specialized articles and this could be done during the medical visit before the initiation of solid foods. This action might decrease the need for mothers to document themselves from non-medical sources such as social media [9]. High risk of choking or aspiration food items should be discussed with the parents. A study conducted on a population of Caucasian women highlighted, using qualitative methods, that the internet and social media are starting to become important sources of information about the child's health. Thus, non-medical sources could contribute to the perpetuation of wrong feeding practices. FB located in the tracheo-bronchial region following food aspiration is the main cause of accidental suffocation deaths in children under 4 years of age [9]. Therefore, another

preventive measure could be the completion of a mandatory pediatric first aid course included in a national program. The inclusion of pediatricians in educational actions is important, because a study estimated that 80% of children who have experienced a choking episode are assessed by pediatricians [2]. Last but not least, the American Academy of Pediatrics suggested a revision of the law related to the packaging of foods with a high risk of aspiration [7,13,18].

## CONCLUSIONS

The parallel between our case and specialized literature data emphasizes and warns pediatricians that the clinical picture and radiological investigations are not always correlated with FBA diagnosis, but bridging the gap with the anamnesis is essential. Discouraging parents from offering risky foods and getting information from non-medical sources through education carried out with the help of doctors is necessary since FBA remains a difficult diagnosis.

*Conflict of interest and ethic statements:*  
the authors declare they do not have any competing interests, financial support or any other conflicts of interest.

## REFERENCES

- Eren S, Balci AE, Dikici B, Doblan M, Eren MN. Foreign body aspiration in children: experience of 1160 cases. *Ann Trop Paediatr*. 2003 Mar;23(1):31-7. doi: 10.1179/000349803125002959
- Rodríguez H et al. Management of foreign bodies in the airway and oesophagus. *Int J Pediatr Otorhinolaryngol*. 2012 May 14;76 Suppl 1:S84-91. doi: 10.1016/j.ijporl.2012.02.010
- Passali D, Lauriello M, Bellussi L, Passali GC, Passali FM, Gregori D. Foreign body inhalation in children: an update. *Acta Otorhinolaryngol Ital*. 2010 Feb; 30(1):27-32.
- Juberg DR, Alfano K, Coughlin RJ, Thompson KM. An observational study of object mouthing behavior by young children. *Pediatrics*. 2001 Jan;107(1):135-42. doi: 10.1542/peds.107.1.135
- Vlad RM, Dobritoiu R, Ionita IG, Toader M. Children would taste anything: foreign body ingestion – a multidisciplinary perspective and clinical practice algorithm. *Ro J Pediatr*. 2023 Jun;72(2):67-73. doi: 10.37897/RJP.2023.2.4
- Reilly JS, Cook SP, Stool D, Rider G. Prevention and management of aerodigestive foreign body injuries in childhood. *Pediatr Clin North Am*. 1996 Dec;43(6):1403-11. doi: 10.1016/S0031-3955(05)70525-3
- Green SS. Ingested and Aspirated Foreign Bodies. *Pediatr Rev*. 2015 Oct;36(10):430-6. doi: 10.1542/pir.36-10-430
- Tseng H-J, Hanna TN, Shuaib W, Aized M, Khosa F, Linnau KF. Imaging Foreign Bodies: Ingested, Aspirated, and Inserted. *Ann Emerg Med*. 2015 Dec;66(6):570-582.e5. doi: 10.1016/j.annemergmed.2015.07.499
- Nasir ZM, Subha ST. A Five-Year Review on Pediatric Foreign Body Aspiration. *Int Arch Otorhinolaryngol*. 2021 Apr;25(2):e193-e199. doi: 10.1055/s-0040-1709739
- Naragund AI, Mudhol RS, Harugop AS, Patil PH, Hajare PS, Metgudmath VV. Tracheo-bronchial foreign body aspiration in children: a one year descriptive study. *Indian J Otolaryngol Head Neck Surg*. 2014 Jan;66(Suppl 1):180-5. doi: 10.1007/s12070-011-0416-2
- Yadav SP, Singh J, Aggarwal N, Goel A. Airway foreign bodies in children: experience of 132 cases. *Singapore Med J*. 2007 Sep;48(9):850-3. [Online]. Available: <http://europepmc.org/abstract/MED/17728968>
- Míndru DE et al. Foreign Body Aspiration in Children – Retrospective Study and Management Novelities. *Medicina (B Aires)*. 2023 Jun;59(6):1113. doi: 10.3390/medicina59061113
- Cramer N, Jabbar N, Tavarez MM, Taylor RS. Foreign Body Aspiration. 2023.
- Chaudhary N, Shrestha S, Kurmi OP. A child with a foreign body in bronchus misdiagnosed as asthma. *Clin Case Rep*. 2020 Dec; 8(12): 2409-13. doi: 10.1002/ccr3.3153
- Shostak E. Foreign body removal in children and adults: review of available techniques and emerging technologies. *AME Med J*. 2018 Jul;3:75. doi: 10.21037/amj.2018.07.02
- Antón-Pacheco JL et al. Foreign body aspiration in children: Treatment timing and related complications. *Int J Pediatr Otorhinolaryngol*. 2021 May;144:110690. doi: 10.1016/j.ijporl.2021.110690
- Na'ara S, Vainer I, Amit M, Gordin A. Foreign Body Aspiration in Infants and Older Children: A Comparative Study. *Ear Nose Throat J*. 2020 Jan;99(1):47-51. doi: 10.1177/0145561319839900
- Cohen S, Goldberg S, Springer V, Avital A, Picard E. [Foreign body aspiration in children]. *Harefuah*. 2015 Mar;154(3):175-7, 211.