

CASE REPORT

An unusual case of occult bronchial foreign body in a 9 years child: a stone from seashore

Desireè Balconara¹, Salvatore M. Carnazzo¹, Sara Manti^{1,2,*}, Giuseppe F. Parisi¹, Maria Papale¹, Salvatore Leonardi¹

*** Correspondence to:**

saramanti@hotmail.it; smanti@unime.it; ORCID: <https://orcid.org/0000-0002-7664-3083>

Doi

10.56164/PediatrRespirJ.2023.24

¹Pediatric Respiratory Unit, San Marco Hospital, University of Catania, Catania, Italy

²Pediatric Unit, G. Martino Hospital, University of Messina, Messina, Italy

ABSTRACT

Pediatric tracheobronchial foreign bodies (PTBFBs) remain a significant cause of childhood morbidity and mortality. Because physicians do not always obtain a history of aspiration and the signs and symptoms of a PTBFB are nonspecific, diagnosis may be delayed, increasing the risk of complications when the foreign body is removed. Flexible fiberoptic and rigid bronchoscopy are often used in tandem to identify and remove PTBFBs. A 9-year-old boy comes to our observation because of persistent shortness of breath at rest and easy fatigability in the last 3 months. The symptom's onset was traced back to a febrile episode two months ago. At that time, the child was admitted to another hospital and discharged with the diagnosis of right bronchopneumonia with radiographic evidence of a radiopaque oval formation referred to a calcified hilar lymph node. By performing a chest CT scan, we posed the suspicion of an endobronchial foreign body, which was confirmed and therefore a stone from seashore was removed by rigid bronchoscopy with rapid improvement in the child's clinical conditions.

IMPACT STATEMENT: This case report underlines the importance of clinical history in diagnosing aspirated foreign bodies, despite unusual age and negative first-level investigations, and bronchoscopy's diagnostic and therapeutic role.

INTRODUCTION

Foreign body aspiration (FBA) is a potentially fatal and quite frequent event in childhood. 80% of cases occur in children under 3 years of age, with a peak incidence between the first and second year of life. From a pathophysiological point of view, children's airways are more susceptible to obstruction due to their small caliber. Most pediatric tracheobronchial foreign bodies (PTBFBs) are organic materials, and most settle in one of the bronchi (1). The most frequently encountered foreign bodies are peanuts and plant seeds (2). Small, spherical, compressible objects with smooth surfaces are those most commonly inhaled. Once inhaled, the foreign body achieves the right main bronchus (50% of cases), the left lung (23%), and, rarely, bilateral involvement is reported (2%). Larger and irregularly shaped objects, on the other hand, mainly stop in the upper airways, especially at the laryngeal level. The time between inhalation and diagnosis depends on several factors, including the degree of airway obstruction, size, shape, and location of the foreign body (3). Diagnosis is crucial as near-to-

KEY WORDS

Child; tracheobronchial foreign bodies; morbidity; differential diagnosis; diagnostic delete.

tal or total airway obstruction may cause asphyxia and death if no immediate intervention is adopted. Symptoms can range from respiratory distress with cyanosis in the most severe forms, requiring rapid clearance, to cases where the object becomes wedged distally. In this last occasion there will be few symptoms such as coughing, wheezing, and choking and it can be often masquerade as asthma, causing misdiagnosis and treatment delay. Most of the time, the actual aspiration event is unnoticed. Despite antibiotic therapy, patients may remain asymptomatic until they present with recurrent infections and persistent radiographic changes in specific chest segments. Aspirated objects migrate distally, and organic objects may induce edema and inflammation. To diagnose the presence of a PTBFB, a detailed anamnesis, physical examination, chest X-ray and computed tomography (CT) are required to identify the exact site and possible complications such as pneumonia and atelectasis; although in some unclear cases radiological investigations are carried out, bronchoscopy should be performed as soon as possible especially in the case of a high suspicion of foreign body aspiration due to the patient's history told. In fact, guidelines recommend that CT scan should not delay bronchoscopy, which still represents the diagnostic-therapeutic gold standard on the field. The most appropriate treatment for managing the tracheobronchial foreign body varies in type and promptness based on the location of the inhaled object. A complete and proximal obstruction causes an acute presentation and requires immediate intervention and life-saving measures. In contrast, a distal and partially obstructing obstruction can remain undetected for several days and, in rare cases, even for months/years, as symptoms tend to be nonspecific. In line with the recommendations of the American Thoracic Society (4), there is a clear preference for rigid bronchoscopy for foreign body removal. A rigid instrument provides a good visualization of airways and allows the use of a large variety of instruments, with adequate manipulation of the foreign body and the possibility of prompt management in case of mucous hemorrhages.

CASE PRESENTATION

A 9-year-old male patient was referred to our hospital for investigation of three-month history featured

by shortness of breath and fatigability. His medical history was unremarkable for accidental aspiration of foreign bodies. Three months before our admission, the patient was hospitalized for fever and underwent chest X-ray showing a 'diffuse reinforcement of the bronchial vascular plot in the right basal site' and 'radiopaque oval formation with clear margins of 14 mm, referring to the first hypothesis to a calcified hilar lymph node'. In parallel, blood samples were taken including blood counts, inflammation indexes (CRP, LDH, procalcitonin), blood gas analyses, hepatic and renal function indexes, serology for *Mycoplasma pneumoniae* and *Chlamydia pneumoniae* antibodies, biofire respiratory filmarray on nasal swab and Mantoux test, but none of these define the etiology of the radiological findings. A diagnosis of right bronchopneumonia was posed, and antibiotic therapy was started. However, in the following weeks, due to the persistence of easy fatigue, tachypnea and coughing, the child was conducted to our unit. Three months after the first hospitalization, the child came to our observation. Clinically, the patient showed 95% oxygen saturation at ambient air, a heart rate of 90 beats/minute, a stable hemodynamic status, and a conserved level of consciousness. Feverish temperature and tachypnea were noted on physical examination. On chest auscultation, there were decreased breath sounds in the right hemithorax and respiratory silence on the basis. The patient also underwent a full spirometry with negative bronchodilator reversibility test, thus ruling out concomitant asthma. Blood tests performed on admission revealed high inflammation indexes. The chest X-ray showed an opacity of about 15 mm of non-univocal interpretation, suspected of an endobronchial foreign body in the right hilar site (**Figure 1**). For this reason, a chest CT was performed, and it confirmed the presence of a radiopaque foreign body (15 x 7 x 10 mm) affecting the secondary tributary bronchus of the lower lobe with partial obstruction of the emergence of the tributary bronchus of the middle lobe, inhomogeneous parenchymal thickening affects the right lower lobe and the middle lobe (**Figure 2A, B, C**).

The child underwent a rigid bronchoscopy, and the foreign body turned out to be a stone (**Figure 3**). The culture of the bronchial lavage revealed multiple

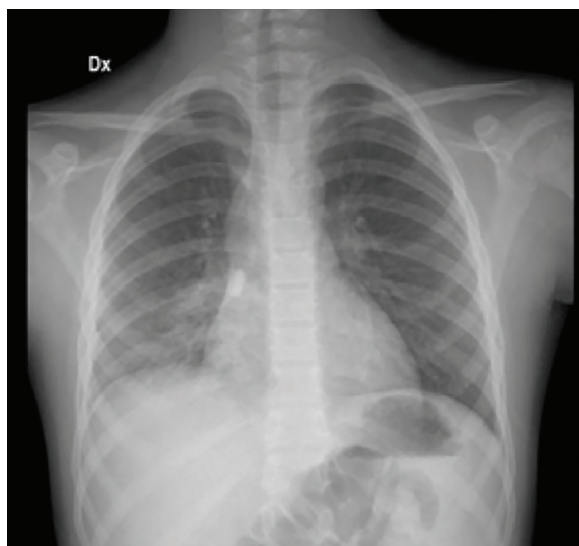


Figure 1. Chest X-ray taken on patient admission, showing a diffuse reinforcement of the bronchial vascular plot in the right basal site and radiopaque oval formation with clear margins of 14 mm, referring to the first hypothesis to a calcified hilar lymph node.

bacterial colonization. It was started corticosteroid anti-inflammatory treatment and large-spectrum antibiotic therapy with cefotaxime metronidazole and amikacin. This consistent antibiotic therapy was started in consideration of the purulent aspect of the bronchoalveolar lavage fluid (waiting for the culture which subsequently showed the presence of gram positive and negative bacteria), in turn due to the long period of the semi-obstructed bronchus and therefore poor ventilation of the underlying parenchyma.

High flows-oxygen therapy was also started for a few hours as the child began to show slight tachypnea



Figure 3. The foreign body removed at bronchoscopy: a beach pebble (15 x 7 x 10 mm).

and desaturation a few minutes after the bronchoscopy's end. The day after the bronchoscopic removal, a control chest X-ray was performed with evidence of the complete absence of the foreign body (**Figure 4**). Respiratory physiotherapy was started with post-operative alveolar recruitment. During a retrospective anamnesis, it emerged that the patient accidentally inhaled a stone while playing soccer on the beach last summer. A follow-up chest X-ray with complete resolution of the right mid-baseline thickening was performed one month after discharge (**Figure 5**).



Figure 2. (A) Chest computed tomography taken on patient admission: cross section and (B) coronal section. Radiopaque foreign body (15 x 7 x 10 mm) affecting the secondary tributary bronchus of the right lower lobe with partial obstruction of the emergence of the tributary bronchus of the middle lobe, inhomogeneous parenchymal thickening affects the right lower lobe and the middle lobe. (C) 3D Computed Tomography: an oval-shaped foreign body is indicated in the red circle.



Figure 4. Chest x-ray performed the day after bronchoscopy, with evidence of the complete absence of the foreign body and persistence of the underlying inflammatory process.

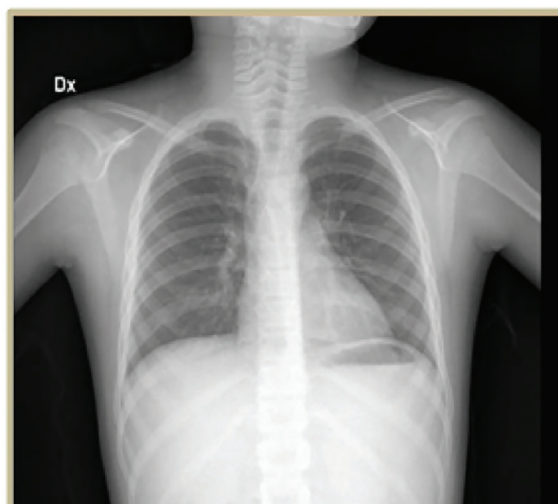


Figure 5. One month post discharge, control chest x-ray is performed: complete resolution of the right mid-basal thickening, inflammatory state in resolution phase.

DISCUSSION

AFBs are common in children, especially in the 1-3 years age group (5) and usually present as emergencies, mainly due to the anatomy of the child's upper airways, the morphology of the larynx and the frequent habit of carrying small objects such as toys (e.g., balls) and foods (e.g., peanuts) in the mouth driven by curiosity towards the surrounding world. In older children and adolescents, neurological diseases or loss of consciousness are the most common causes of FB aspiration. The diagnosis of inhalation of AFBs can be deleted because symptoms are not specific, patients and families tend to forget the event, and not all AFBs result in radiographic abnormalities. On the other hand, the sudden onset of transient cyanosis, cough and dyspnea or tachypnea in a previously healthy child, without a history of malaise or fever, should raise alarms for the presence of an inhaled foreign body. Chronic lodgement of foreign bodies in the trachea is rarer than in the bronchial tree; moreover, most of the AFBs in children are organic materials (6). FB aspiration should always be considered in the differential diagnosis of chronic or recurrent respiratory diseases, even in the absence of a previous choking event. In fact, clinical and radiological findings should be carefully evaluated because delays in diagnosis and treatment of foreign bronchial bodies should be avoided to prevent long-term complications of prolonged retention such as

pneumonia, atelectasis, bronchiectasis, or lung abscess. Chest X-Ray is not specific for diagnosis of foreign body aspiration and a normal chest X-Ray does not always rule out the diagnosis of foreign body aspiration in patients with a history suggestive (7). Although CT occasionally demonstrates an opacity not visualized on the chest x-ray, it should not be considered as one of the initial diagnostic methods for FBA. CT may help with the differential diagnosis of suspected cases having atypical histories. The differential diagnosis in such cases include tracheobronchial obstructions caused by external compression of airways (e.g., enlarged lymph node) or intraluminal obstructions (e.g., tumors; granulomatous tissue) (7).

In children with a witnessed choking event, even with normal physical and radiographic findings, FBA should be excluded by endoscopy; in fact, negative radiography findings should not preclude bronchoscopy in patients with a strong history. According to a recent study on 130 patients (8), the cough was the most frequent symptom (76.1%), and unilateral air trapping was the most common radiological finding (48.8%). Suggestive symptoms and/or suggestive physical and/or radiological findings, even in the absence of a history of choking, may also indicate bronchoscopy. Bronchoscopy has a dual role in this setting: diagnostic and therapeutic. Rigid bronchoscopy is considered the intervention of choice for FB extraction in children (9).

CONCLUSIONS

The age of accidental inhalation of a foreign body (9 years), the type of FBA, and the dynamics of the event – the object is probably not penetrated by the nostrils but by the mouth due to its size makes this case interesting. To the best of our knowledge, this is the only case of accidental aspiration of a stone of dimension of 15 x 7 x 10 mm reported in a 9-year child. This case report underlines the importance of clinical history in diagnosing aspirated foreign bodies, despite unusual age and normal radiological findings.

COMPLIANCE WITH ETHICAL STANDARDS

Conflict of interests

The Authors have declared no conflict of interests.

Financial support

There were no institutional or private fundings for this article.

Author contributions

DB and SC wrote the first-draft; SM reviewed the manuscript; GFP and MP collected the data; SL was the supervisor. .

Ethical approval

Human studies and subjects

Informed consent from patient's parents was obtained to publish the case and its images.

Data sharing and data accessibility

The data underlying this article are available in the article.

Publication ethics

Plagiarism

The contents of the article are original and any overlaps with other articles are by the Authors themselves and appropriately cited.

Data falsification and fabrication

All the data correspond to the real.

REFERENCES

1. Yadav SP, Singh J, Aggarwal N, Goel A. Airway foreign bodies in children: experience of 132 cases. *Singapore Med J*. 2007;48(9):850-3. PMID: 17728968.
2. Tanahashi M. Tracheobronchial Foreign Body. *Kyobu Geka*. 2022;75(10):851-8. Japanese. PMID: 36155582.
3. Passali D, Gregori D, Lorenzoni G, Cocca S, Loglisci M, Passali FM, et al. Foreign body injuries in children: a review. *Acta Otorhinolaryngol Ital*. 2015;35(4):265-71. PMID: 26824213.
4. Dirk Schramm, Nadine Freitag, Thomas Nicolai, Anna Wiemers, Bernd Hinrichs, Peter Amrhein, et al. Pediatric Airway Endoscopy: Recommendations of the Society for Pediatric Pneumology. *Respiration*. 2021;100(11):1128-45. doi: 10.1159/000517125.
5. Hsu Wc, Sheen Ts, Lin Cd, Tan Ct, Yeh Th, Lee Sy. Clinical experiences of removing foreign bodies in the airway and esophagus with a rigid endoscope: a series of 3217 cases from 1970 to 1996. *Otolaryngol Head Neck Surg*. 2000;122(3):450-4. doi: 10.1016/S0194-5998(00)70063-5.
6. Sapkota R, Sharma A, Bastola P. An unusual tracheal foreign body residing for 15 years: A case report and review of literature. *Respirol Case Rep*. 2022;10(6):e0982. doi: 10.1002/rcr2.982 PMID: 35634249; PMCID: PMC9130558.
7. Sattar A, Ahmad I, Javed AM, Anjum S. Diagnostic accuracy of chest x-ray in tracheobronchial foreign body aspiration in paediatric patients. *J Ayub Med Coll Abbotabad*. 2011;23(4):103-5. PMID: 23472427.
8. Antón-Pacheco JL, Martín-Alelú R, López M, Morante R, Merino-Mateo L, Barrero S, et al. Foreign body aspiration in children: Treatment timing and related complications. *Int J Pediatr Otorhinolaryngol*. 2021;144:110690. doi: 10.1016/j.ijporl.2021.110690.
9. Eber E, Antón-Pacheco JL, de Blic J, Doull I, Faro A, Nenna R, et al. ERS statement: interventional bronchoscopy in children. *Eur Respir J*. 2017;50(6):1700901. doi: 10.1183/13993003.00901-2017.