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Case Report

A missed foreign body aspiration masquerading as congenital pulmonary airway malformation in a nine-year-old boy: A case report and literature review

Xiaofen Tao ^{a,b,1}, Shuxian Li ^{a,b,1}, Lei Wu ^{a,b}, Zhimin Chen ^a, Yingshuo Wang ^{a,b,*}^a Department of Pulmonology, Children's Hospital, Zhejiang University School of Medicine, National Clinical Research Center for Child Health, Hangzhou, Zhejiang, 310052, China^b Department of Endoscopy Center, Children's Hospital, Zhejiang University School of Medicine, National Clinical Research Center for Child Health, Hangzhou, Zhejiang, 310052, China

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ABSTRACT

Although airway foreign body aspiration (FBA) is a common occurrence in any age group, unrecognized and retained foreign bodies in lungs may result in severe complications, such as lung abscess or bronchiectasis. In rare cases, FBA may present with similar clinical features as many other diseases (e.g. asthma, tumor, pulmonary eosinophilia). Here, we report a rare case of missed FBA in a nine-year-old boy, whose chest CT scan was suggestive of a cavitary lesion in the left lower lobe mimicking congenital pulmonary airway malformation (CPAM). However, surprisingly, flexible bronchoscopy revealed a peanut lodged in the lateral basal segment of left lower lobe, which was subsequently retrieved by a forceps and avoided unnecessary surgical lobectomy. Therefore, FBA can mimic other disorders (e.g. CPAM), and a high index of suspicion and additional diagnostic techniques (e.g. flexible bronchoscopy) may be required to distinguish them. Additionally, FBA should be considered in the differential diagnosis of respiratory disorders in children even lack of aspiration history.

1. Introduction

Foreign body aspiration (FBA) continues to be a common but potentially life-threatening event in childhood, which requires early detection and intervention [1]. The prevalence of FBA was found to be in a high incidence, ranging from 20.4 to 29.9 per 100,000 pediatric children [2,3]. Occasionally, the diagnosis of FBA was delayed due to lack of aspiration history, non-specific clinical symptoms and signs, and misleading imaging signs [1,4,5]. Retained foreign body in lung usually gives localized signs (e.g. localized hyperinflation, persistent/recurrent consolidation or atelectasis in the same location), and may result in serious complications (e.g. recurrent or persistent pulmonary infection, chronic cough and wheezing, bronchiectasis, hemoptysis, and even lung abscess) [1,6,7]. Also, undiagnosed and retained FBA may mimic other respiratory diseases, for instance, pneumonia, tumor, asthma and pulmonary eosinophilia [1,4,5]. Although FBA is more frequently observed in children aged 1–3 years, it can occur in all age groups [1]. Here, we describe a rare case of missed FBA in a nine-year-old boy, which was initially suspected as a congenital pulmonary airway malformation (CPAM).

* Corresponding author. Department of Pulmonology, Children's Hospital, Zhejiang University School of Medicine, National Clinical Research Center for Child Health, 3333 Binsheng Road, Hangzhou, Zhejiang, 310052, China.

E-mail address: wangyingshuo@zju.edu.cn (Y. Wang).

¹ These authors contributed equally to this work.

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1.1. Case presentation

An otherwise healthy nine-year-old boy was referred to our hospital on November 10th, 2017 searching for a surgical intervention for a suspected CPAM. The patient was initially admitted to a local hospital because of recurrent fever, cough and expectoration for one month. The chest X-ray demonstrated a left lower lobe pneumonia, which was subsequently treated with oral antibiotics for one week. However, little symptomatic improvement was observed. A contrast-enhanced computed tomography (CT) scan of the chest taken on October 18th, 2017 revealed a thick-walled multiloculated lesion with smooth inner border and homogeneous central low density in the left lower lobe (Fig. 1A and B). No previous chest imaging was available for comparison. On the basis of the radiological findings, the first radiological impression was CPAM with superimposed infection. He was started on intravenous broad spectrum antibiotics for three weeks. Once the infection was under control, he was transferred to our hospital for a lobectomy to avoid recurrent infection, which is the most common complication of CPAM.

On presentation to our institution, the patient had a little bit of dry cough without fever. His vital signs on arrival were as follows: body temperature, 36.8 °C; blood pressure, 110/75 mmHg; heart rate, 100 beats/min; respiratory rate, 28 breaths/min; transcutaneous oxygen saturation on room air, 98 %. Clinical systemic examination was normal, except for decreased breath sounds over the left lower lobe. All routine laboratory tests, including the hematological profile and blood chemistry examination, and electrocardiography were within normal limits. He was born healthy at full-term with a birth weight of 3300g via caesarean section without complications or reported anomalies during pregnancy or the delivery. Histories of night sweats, loss of weight, chest pain, hemoptysis, chest trauma or a witnessed cough/choke episode were negative. The patient was evaluated by a cardiothoracic surgeon and a left lower lobectomy was planned. However, during perioperative preparation, we arranged a contrast-enhanced CT scan on November 14th, 2017 for checking the resolution of pulmonary infection. Surprisingly, it depicted irregular patchy shadow in the lateral segment of left lower lobe without any septa and multicystic cavities (Fig. 1C and D). Considering the extension of the lesion was smaller than the previously described abnormalities, diagnostic bronchoscopy was performed using a flexible fiberoptic bronchoscope (BF-P260, Olympus, Japan) with an external diameter of 4.0 mm and a working channel of 2.0 mm for differential diagnosis and pre-

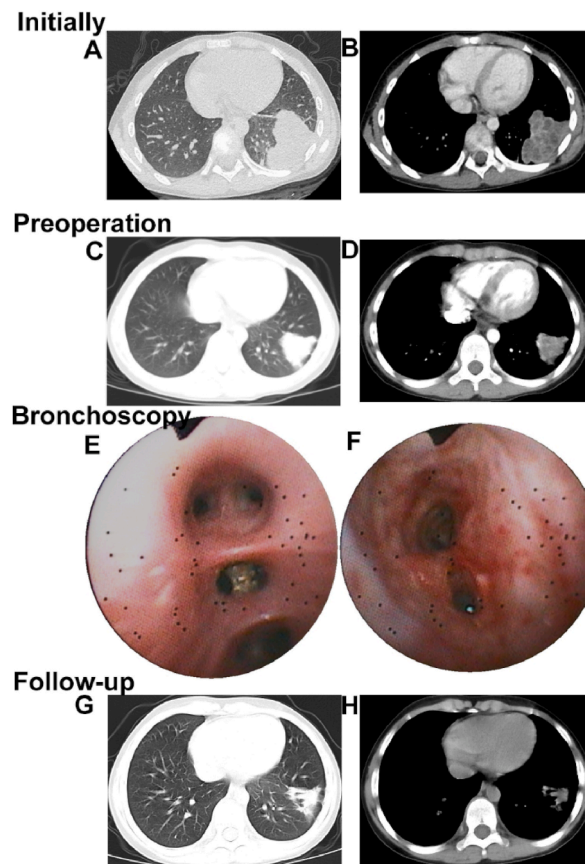


Fig. 1. Parenchymal view (A) and mediastinal view (B) of initial chest contrast-enhanced computed tomography (CT) scan showing a thick-walled multiloculated lesion with smooth inner border and homogeneous central low density in the left lower lobe. Parenchymal view (C) and mediastinal view (D) of chest contrast-enhanced CT scan after antibiotic therapy revealing irregular patchy shadow in the lateral segment of the left lower lobe without any septa and multicystic cavities. (E) Flexible bronchoscopy showing half a peanut lodged in the lateral basal segment of left lower lobe. (F) The aspect after foreign body removal. Parenchymal view (G) and mediastinal view (H) of follow-up chest CT scan after foreign body removal showing further resolution of the lesion and residual localized bronchiectasis in it.

operative evaluation. Unexpectedly, a missed foreign body was lodged in the lateral basal segment of left lower lobe with granulation tissue and necrotic bronchus mucosa around it (Fig. 1E and F). Successful retrieval of the foreign body was achieved with forceps of 1.8 mm diameter (Radial Jaw, Boston Scientific Corporation) under flexible bronchoscopy. Gross appearance revealed it as half a peanut. However, neither the patient nor his parents could recall the exact time of the peanut inhalation event, as they ate peanuts almost every day. Still, the diagnosis of peanut aspiration was established. After the procedure the patient was continued on antibiotics. A follow-up chest CT scan on November 20th, 2017 showed further resolution of the lesion and residual localized bronchiectasis in it (Fig. 1G and H). During 3-year follow up, the patient was in good condition and completely asymptomatic.

2. Discussion

Sixty to eighty percent of FBA occurs in childhood, especially in infants and toddlers [1]. Generally speaking, history of choking, sudden-onset coughing, cyanosis, stridor and wheeze are the common symptoms of FBA at presentation [1]. Unfortunately, lack of history of choking or witness of FBA and the manifestation of CT scan compelled physicians of local hospital to make the provisional diagnosis of CPAM without a second thought, implying FBA is a deceptive condition and pointing out the importance of considering the possibility of a foreign body in the airway as an alternative. In short, FBA should be taken in consideration in any child with respiratory disorders even without a positive history and typical symptoms [8–10].

It is known that a long-standing foreign body in the bronchial tree not only results in inflammation but also provokes related complications such as bronchiectasis, hemoptysis and empyema [1]. However, it was an unusual FBA with radiological evidence mimicking CPAM in a school-age child with long duration of cough and fever. It suggests in rare circumstance, the clinical scenario, symptoms, and even CT scan may masquerade those of CPAM. The pathophysiology of present case mimicking CPAM on chest imaging might be FBA-related prolonged obstruction and secondary pulmonary infection destroying the alveolar septa, forming the cystic cavities filled up with necrotic substance and excretion. Additionally, both FBA and CPAM can predispose to various superadded infection [1,11]. Our patient is an example of delayed diagnosis of FBA and misinterpreted as CPAM with superimposed infection, suggesting these two entities can be indistinguishable radiographically and make diagnosis challenging. Particularly, the therapeutic strategies are different for these two entities [12,13]. Briefly, CPAM generally needs resection while FBA may be resolved with less invasive procedure (e.g. flexible bronchoscopy) [12,13]. This highlights the importance of distinguishing FBA from multiloculated lung lesions (e.g. CPAM) in children to avoid unnecessary surgical lobectomy. Likewise, there were several reports of patients with FBA misdiagnosed as other diseases, including asthma, tumor, pulmonary eosinophilia [4,5]. For instance, Gopathi et al. disclosed areca nut aspiration triggered allergic reaction mimicking eosinophilic pneumonia in an agricultural worker [5]. A pea aspiration masquerading as airway obstruction caused by a tumor in an 84-year-old patient with chronic obstructive pulmonary disease was reported by Muramatsu et al. [4]. Undoubtedly, our case was a complement to previous studies [4,5]. Collectively, these data further emphasize that FBA is still a challenge in terms of diagnosis, and physician should be alert to any possible FBA when encountering airway symptoms in all age groups.

CPAM, as a rare development abnormality of the lung, occurs more commonly in infancy with prenatal ultrasound lung anomalies [11]. Still, there are no clinical or radiological features that are specific enough for distinguishing CPAM unequivocally from FBA [14–16]. As seen in our case, it should be prudent to diagnosis CPAM in a previously healthy children without reported deformities during pregnancy. Furthermore, resolution of the lesion on repeated chest imaging is a key diagnostic manifestation that occurs only in FBA as opposed to CPAM. Indeed, a negative chest CT does not necessarily rule out the existence of the foreign body and obviates the need for direct visualization of the airways [17]. The regression of the lesion in our case may be attributed to the incomplete airway obstruction and antimicrobial therapy of superimposed infectious process, which facilitate the partial drainage of the inflammatory exudate.

By providing a direct field of vision, bronchoscopy is a key technique for identification and removal of the foreign body [18]. In our case, the definitive diagnosis was achieved by flexible bronchoscopy, indicating flexible bronchoscopy is the most sensitive and most specific examination in the diagnosis of FBA [19], especially in the presence of a confusing CT manifestation but lack of a choking history and typical symptoms. Although rigid bronchoscopy remains the gold standard for the management of FBA in children [18], the distal foreign body in our case was successfully retrieved with forceps through the working channel of the flexible bronchoscope, implying flexible bronchoscopy allows the inspection of more distal airway with better navigational properties [18]. Moreover, many studies have considered flexible bronchoscopy as a short, safe and efficient procedure for inhaled foreign body removal in children [18]. Moslehi MA demonstrated massive meat aspiration managed by an extraction using bronchoscopy cryoprobe, because the FB was friable and failed to be grasped by forceps [20]. Altogether, these experience imply flexible bronchoscopy is recommended in children with insufficient findings for definite diagnosis of FBA, and further dealing with FBA with variety of instruments (e.g. forceps, baskets and cryoprobes).

3. Conclusions

It is a rare event that a patient suspected to have CPAM has a FBA. We report an interesting case of FBA mimicking CPAM, of which the features could be misleading for clinicians. Still, the possibility of FBA should be considered as a differential diagnosis in the evaluation of respiratory disorders to assist in making an early diagnosis, especially in high-risk populations. Though regression of the lesion on repeated chest imaging may help to distinguish FBA from CPAM, further diagnostic evaluation with bronchoscopy is essential to make an accurate diagnosis.

Author contributions

The authors are identified with their initials. XT and SL evaluated the patient, performed flexible bronchoscopy, drafted and revised the manuscript. They contributed equally to this work. LW and ZC participated in evaluating the patient and helped to draft the manuscript. YW conceived the study and edited the manuscript. YW was the supervisor. All of the authors critically reviewed, revised, and approved the final manuscript, and agreed to be responsible for all aspects of the work.

Data availability statement

All data of this study are presented in the manuscript, and any further inquiries associated with this study can be directed to the corresponding authors.

Ethics statement

Written informed consent was obtained from the parents of the patient for publication of this case report and any accompanying images. Ethical approval was obtained from the Ethics Committee of the Children's Hospital, Zhejiang University School of Medicine (Reference Number: 2022-IRB-020).

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Declaration of competing interest

The authors declare that they have no conflict of interests.

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