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Case report

Recurrent pneumonia, a diagnostic challenge

Cláudia João Lemos[1], Sofia Vasconcelos Lopes[2], Andreia Lopes[2]

[1]Pediatrics Department, Centro Materno-Infantil do Norte, Centro Hospitalar Universitário do Porto EPE, Porto, Portugal

[2]Pediatrics Department, Hospital da Senhora da Oliveira Guimarães, Guimarães, Braga, Portugal

Abstract

Recurrent pneumonia in children is a rare situation, and foreign body (FB) aspiration is always an important cause to discard, especially in young children. We report a case of a 20-month-old boy with a history of recurrent pneumonia since 13 months of age, associated with chronic diarrhea and failure to thrive. After extensive investigation, chest computed tomography raised the possibility of an FB aspiration, and bronchoscopy confirmed a right upper lobe bronchus obstruction by a fragment of chicken meat. A high degree of clinical suspicion is essential to diagnose inhaled FB, which should be considered in the presence of recurrent pneumonia, even if there was not a known episode of choking.

Keywords

Recurrent pneumonia, foreign body, aspiration, inhaled foreign body, bronchoscopy, pneumology.

Corresponding author

Cláudia João Lemos, Pediatrics Department, Centro Materno-Infantil do Norte, Centro Hospitalar Universitário do Porto EPE, Rua da Maternidade, 4050-371 Porto, Portugal; email: claudiajoaolemos@gmail.com.

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Case report

We report a case of a 20-month-old boy with a 7-month history of recurrent pneumonia. There was no relevant personal or familial medical history, no known contacts with tuberculosis or chronic cough disease, and he had a complete immunization program.

He had a total of 5 episodes of right lobar pneumonia. After the 1st episode at 13 months of age, he developed wheezing, associated with chronic diarrhea and failure to thrive.

Clinical presentation in all the episodes included fever, cough, mild respiratory distress without hypoxemia and bilateral crackles and wheezes at lung auscultation. Chest radiography consistently demonstrated consolidation on the mid third of the right lung (**Fig. 1**). Outpatient management was decided on the first 4 episodes, with inhaled bronchodilators and oral antibiotics, namely amoxicillin, sometimes associated with azithromycin. He was asymptomatic between the episodes.

On the 5th episode, he was admitted for further diagnostic investigation and intravenous (IV) treatment. He presented with 1 week of persistent cough, rhinorrhea, progressively worsening dyspnea and fever. At urgency admission, he had a generally good appearance, fever (38ºC), 97% oxygen saturation at room air, respiratory frequency of 60 breaths per minute, prolonged expiratory time, and bilateral crackles and wheezing, predominantly on the right hemithorax. Blood test demonstrated leukocytosis (white blood cell count of 23.5 × 10^3/μL) with neutrophilia and mildly elevated C-reactive protein (22.6 mg/L). Chest radiograph showed a consolidation on the same location as previous episodes, with hyperlucency in the upper zone of the right lung (**Fig. 2**).

An extended study was held, excluding underlying immunodeficiency (normal values of complement, serum immunoglobulins and white blood cell immunophenotyping), cystic fibrosis (normal sweat chloride test) and alpha 1 antitrypsin deficiency. Viral testing of the nasopharyngeal wash and blood culture were negative, as well as the interferon-gamma release assay (IGRA) blood test screen for exposure to tuberculosis.

Chest computed tomography (CT) was performed (**Fig. 3**), demonstrating subsegmental consolidation and partial atelectasis of the posterior and anterior segments of the right upper lobe (RUL). Additionally, the remaining parenchyma of the RUL was diffusely hyperlucent in comparison with the other pulmonary lobes, and there was a mild left mediastinal shift. The RUL bronchus showed abrupt truncation (bronchial cut-off sign), raising the possibility of a foreign body (FB) aspiration. When questioned, the parents denied any sudden episodes of cough or choking in the past.

Flexible bronchoscopy confirmed an RUL bronchus obstruction by an FB, which was removed with the use of a rigid bronchoscope. The impacted object was a fragment of chicken meat. Airway configuration was normal, and the microbiological study of the bronchoalveolar lavage was negative.

Patient management included a 14-day course of IV ceftriaxone, inhaled steroids and bronchodilators, respiratory kinesiotherapy, and 3 days of systemic corticotherapy after bronchoscopy. At

Figure 1. Frontal chest radiograph of one of the previous episodes, showing a consolidation on the mid third of the lung, adjacent to the right hilum, suggestive of pneumonia.

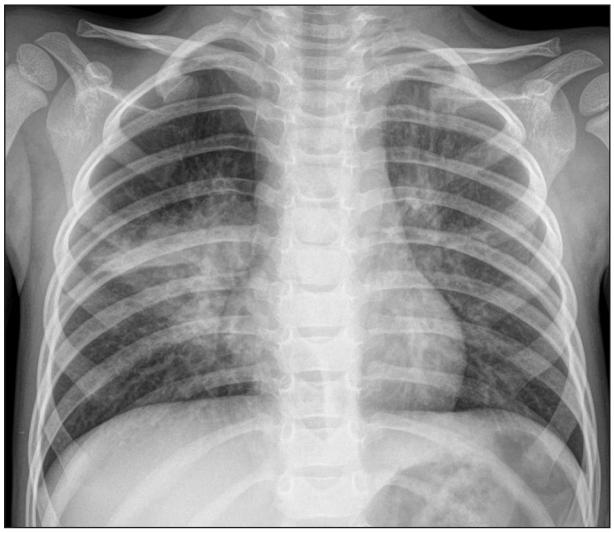

Figure 2. Frontal chest radiograph on admission (2 months after **Fig. 1**), revealing similar pulmonary consolidation. Additionally, the upper zone of the right lung is hyperlucent compared to the remaining pulmonary parenchyma.

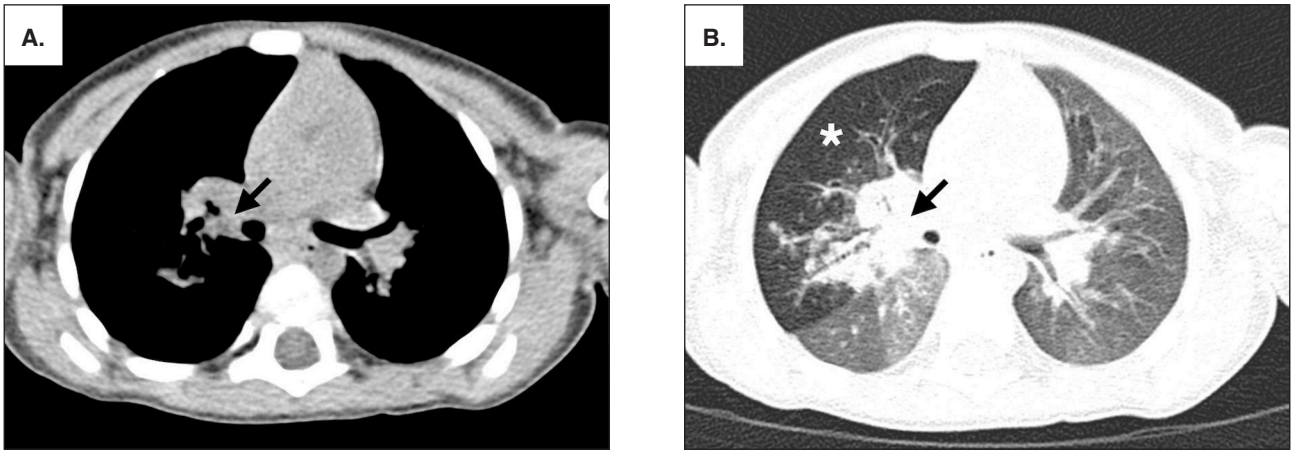

Figure 3. Unenhanced computed tomography (CT) images in the axial plane, on mediastinal (**A**) and lung windows (**B**). There is subsegmental consolidation and partial atelectasis of the posterior and anterior segments of the right upper lobe (RUL), with the remaining parenchyma diffusely hyperlucent and hyperexpanded (asterisk), causing left mediastinal shift. The RUL bronchus shows abrupt truncation (arrow), raising the possibility of a foreign body aspiration.

discharge, the patient's symptoms had significantly improved, and physical examination was normal.

The subsequent study of the chronic diarrhea revealed negative parasite stool test, negative celiac disease screening, and fecal calprotectin of 69 µg/g. This symptom progressively resolved, thus at 28 months of age he had type 4 stools, according to the Bristol Stool Form Scale, and he gained weight, catching up the original weight curve percentile. In the period of 1 year after the FB removal, he had only 2 episodes of wheezing during the winter season, and no more pneumonia episodes.

Discussion

Recurrent pneumonia in children is a rare situation whose evaluation requires close attention to the clinical history and physical examination, and in selected cases extensive investigation. It can be due to an underlying disease, such as cystic fibrosis, cardiopulmonary disease, or immunodeficiency, particularly if it affects more than one lobe [1]. When limited to a specific location of the lung (e.g., a single lobe), it is usually caused by a bronchial obstruction, which could be intra- or extra-luminal, or a structural malformation of the bronchus. Intra-luminal obstruction is the most frequent situation, being FB aspiration the most important cause in children [1].

Most victims of FB aspiration are infants and toddlers, especially those younger than 3 years of age, and food items are the most common objects inhaled at this age [2-5].

A high degree of clinical suspicion is essential in diagnosing inhaled FB. Children with lower airway FBs may present with subtle or nonspecific symptoms, and in the absence of a history of choking, FB aspiration may not be suspected. Clinical manifestations depend on the location of the FB, its characteristics (size and composition), as well as how much time has passed since the event (which depends on whether it was witnessed or not). The right main bronchus is the most frequent location, in around 60% of the cases [6]. The most common symptom is cough, followed by tachypnoea and stridor, often with focal wheezing or decreased breath sounds, but nonspecific findings like generalized wheezing are often present. Delayed diagnosis can result in serious acute and chronic complications [3]. The longer the FB is retained, the more probable are complications, such as infection and inflammation of the airway distal to the obstructed airway. Therefore, these patients may present with fever and other signs and symptoms of pneumonia.

Chest radiographs are the first step in the imaging evaluation, although they have limited use since the majority of inhaled FB are radiolucent (80-96%). Still, secondary findings such as air trapping, asymmetric hyperinflation, obstructive emphysema, atelectasis, mediastinal shift, and consolidation are possible indicators of an FB [2-4, 7, 8].

CT in the presented case was helpful to exclude other causes of recurrent pneumonia. It is an accurate and reliable diagnostic tool for patients who are asymptomatic and have normal or inconclusive plain radiographs with an ongoing clinical suspicion of FB aspiration [9].

Nevertheless, if there is a high index of suspicion despite negative or questionable

imaging, a bronchoscopy should be performed [2]. Flexible bronchoscopy may be used for diagnostic purposes in cases in which the diagnosis is unclear, but rigid bronchoscopy is the procedure of choice to identify and remove the object [10, 11].

Conclusion

Recurrent pneumonia in children can be a diagnostic challenge. This case emphasizes the importance of considering the possibility of an FB aspiration in any child with prolonged respiratory symptoms or recurrent pneumonia, even if there was not a known episode of choking. The late recognition of this condition can lead to irreversible consequences.

Learning points

- FB aspiration should be considered as a possible diagnosis in cases of recurrent localized pneumonia.
- The most common inhaled objects in children younger than 3 years old are food items.
- Symptoms are subtle and radiographic findings unreliable, so a high degree of clinical suspicion is essential, as a delayed diagnosis can result in serious acute and chronic complications.
- Rigid bronchoscopy is the procedure of choice to identify and remove the object.

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Declaration of interest

The Authors declare no conflicts of interest. No sources of funding have been attributed to this paper.

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