

CASE REPORT

PEANUT ASPIRATION MASQUERADING AS AN ASTHMA EXACERBATION

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ABSTRACT

A case is discussed of a child who presented with wheeze, cough and respiratory distress. Because of her history of asthma she was admitted and treated for an acute exacerbation of that asthma. Significant diagnostic delay occurred before the diagnosis of foreign body aspiration was made.

Not all that wheezes is asthma. There are many conditions that may be mistaken for asthma. Aspirated foreign body is an important differential diagnosis for asthma. Peanut aspiration can masquerade both as 'asthma' (wheezing in a non-asthmatic child) and as 'an exacerbation of asthma' (wheezing in an established asthmatic).

Asthma is the most common chronic disease in South African children. Common differential diagnoses of asthma in South Africa include transient infantile wheezing, viral-associated wheeze, bronchiolitis, pneumonia and tuberculosis; however there are a large number of rarer diseases that can masquerade as asthma.

CASE REPORT

FT, a two-and-a-half-year-old girl, presented to the medical emergency department of Red Cross Children's Hospital with sudden onset of noisy breathing, and such severe shortness of breath she was 'unable to cough'. She had had a runny nose and cough for the past 3 days.

The history on arrival was that she was asthmatic, attending the local clinic frequently for 'chestiness', where she was usually given salbutamol syrup and an antibiotic. She had never been admitted to hospital and was not on any regular medications or inhalers. She had an uncomplicated birth at term, was growing well, her immunisations were up to date and she had no other medical problems. Her 6-year-old brother and paternal grandfather have asthma, and her mother smoked during pregnancy and continues to do so.

On arrival she was in severe respiratory distress and wheezing audibly. She was hypoxic, with oxygen saturation of 90% in room air and a palpable pulsus paradoxus. Her lungs were hyperinflated and bilateral inspiratory and expiratory wheezes were heard on auscultation. Breath sounds were thought to be decreased over the right lung. Chest X-ray showed marked bilateral hyperinflation (slightly greater on the right than left) and patchy infiltrates in the right middle zone (Fig. 1).

She was assessed as having an acute severe asthma exacerbation precipitated by an upper respiratory tract

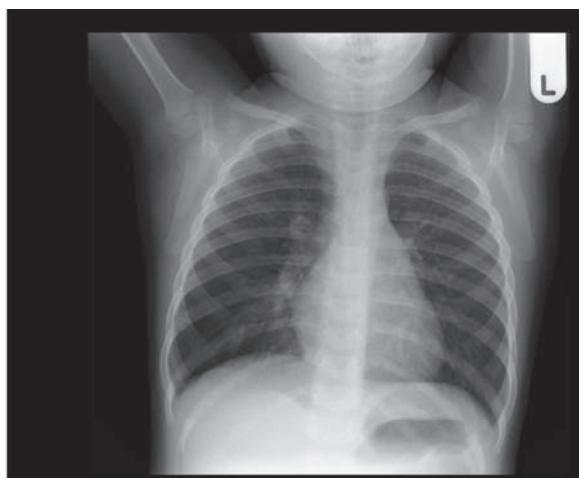


Fig. 1. Initial chest X-ray with hyperinflation and patchy infiltrates.

infection. She was put on nasal prong oxygen (NPO₂) and nebulised with short-acting beta₂-agonists (SABA) and anticholinergics. Oral steroids were given, and recurrent nebulisation, but when there was little improvement after 3 hours, she was admitted to a high-care ward and started on a magnesium sulphate infusion. Despite these interventions, she remained severely distressed with bilateral wheezes and a pulsus paradoxus, and was therefore admitted to the intensive care unit (ICU).

In ICU she received intravenous (IV) dexamethasone, a salbutamol infusion and IV antibiotics. Her oxygen saturation was maintained above 95% on NPO₂ and regular nebulisation was continued. A repeat chest X-ray was noted to show excessive hyperinflation and hyperlucency of the right lung compared to the left lung (Fig. 2), but clinically she had equal air entry bilaterally.

She remained in ICU for 3 days showing gradual improvement, but was noted to have several episodes of

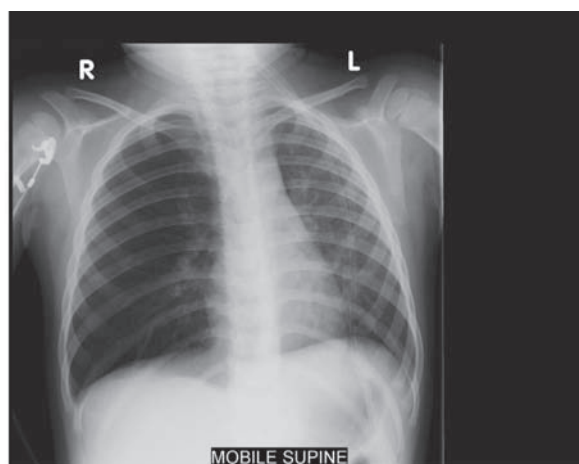


Fig. 2. Repeat chest X-ray with hyperinflation, depressed hemidiaphragm, hyperlucency of the right lung and mediastinal shift.

acute deterioration during this time. Viral screen on a nasopharyngeal aspirate was positive for respiratory syncytial virus. On discharge she had been successfully weaned off the salbutamol infusion, but remained moderately distressed with bilateral wheezing and still required nasal flow oxygen and regular nebulisation.

In the ward she was changed to oral steroids and antibiotics and started on a budesonide metered dose inhaler (MDI) 400 µg twice daily and a salbutamol MDI 4 hourly. She showed no further improvement over the next few days and then acutely deteriorated 48 hours after leaving ICU with a sudden onset of severe respiratory distress with a palpable pulsus paradoxus, and in addition was drowsy and exhausted, hypoxic on NPO₂, with a silent chest on auscultation. Nebulisation with a combination of SABA, anticholinergic and magnesium sulphate initially had a good effect, but was followed shortly thereafter with sudden onset of stridor and increase in respiratory distress associated with markedly decreased air entry over her right lung.

The clinical picture, together with the sudden deterioration and onset of stridor, suggested the diagnosis of foreign body inhalation. The mother was asked about this possibility, and acknowledged that the initial symptoms had started immediately after she choked while eating peanuts.

While awaiting an emergency bronchoscopy she was readmitted to ICU for observation. Rigid bronchoscopy revealed three peanut fragments, one lodged in each of the main bronchi and the trachea. These were removed and a saline washout performed. The airway mucosa was inflamed but there was no evidence of infection.

Post bronchoscopy she was undistressed and saturating well in room air, although she remained hyperinflated with right-sided wheezes. She was discharged home the next day, and given an asthma diary to evaluate her need for controller medication.

DISCUSSION

This child presented with lower airways obstruction. Because of her history of asthma she was admitted and treated as having an acute asthma exacerbation. Not all that wheezes is asthma. There are many conditions that may be mistaken for asthma. Aspirated foreign body is an important differential diagnosis for asthma and should also be considered in the child with established asthma who has an exacerbation that does not respond to standard treatment.

Foreign body aspiration

Foreign body aspiration occurs commonly in paediatric practice. Most foreign body aspiration occurs in children below the age of 3¹⁻⁵ and it is more common in males.^{1,3-6} It is not always immediately diagnosed, partly because foreign body aspiration can present with a wide variety of clinical signs^{5,7} which can vary in severity or even be completely asymptomatic.¹

Pointers towards classic foreign body aspiration include a characteristic history of a choking episode followed by coughing spells.⁸ Physical examination may reveal respiratory distress, unequal chest expansion, unilateral wheezing and/or decreased breath sounds. However, these signs may quickly subside or examination may be normal¹ and the diagnosis may be delayed for long periods of time,^{1,6,7} especially in young children in whom a choking episode is not witnessed.⁸ In cases of delayed diagnosis, pneumonia is a common presentation^{6,7} and the presence of a foreign body should be suspected in any patient with unexplained chronic pulmonary symptoms.

Inhaled foreign bodies do not always cause obstruction. If the foreign body is small in relation to the airway

where it lodges, air can still pass freely; however if it obstructs the entire lumen, no air can pass. If the foreign body allows air entry during inspiration but prevents exit of air during expiration, this one-way valve mechanism causes localised hyperexpansion of that segment of the lung. This occurs because there is a larger diameter of the airway during inspiration as a result of higher intrathoracic negative pressure, and a smaller diameter during expiration.

Organic material, predominantly food particles (especially peanuts), constitute the majority of aspirated objects.^{1,3-5,7} Organic foreign bodies that lodge in the airways and cause subtotal obstruction may subsequently absorb water and swell or may cause an inflammatory/irritant reaction in the airways to cause total airway obstruction.

Inorganic foreign bodies are much rarer, and include beads, coins, toys and batteries. These may be easily seen on chest X-ray. However with the majority of foreign body aspirations, the object is radiolucent and is not directly seen on chest X-ray. Abnormal findings are found in 50-65% of chest X-rays in children with proven foreign bodies; however X-rays may be completely normal.¹ Chest X-ray may show air trapping (bilateral or unilateral), atelectasis, mediastinal shift, infiltrates or consolidation. A lateral chest X-ray may differentiate foreign body in the airway versus the oesophagus.

Hyperinflation of the obstructed lung is better visualised in an expiratory film; comparing expiratory and inspiratory films may reveal obvious air trapping in the expiratory film but this has low sensitivity and specificity.⁹ The obstructed lung has a lower hemidiaphragm (and occasionally mediastinal shift) and may be more radiolucent indicating a larger volume.¹⁰ However it is not possible to obtain inspiratory and expiratory films in young children and other techniques such as two lateral decubitus films, one on each side, may be less reliable. Decreased ventilation of the obstructed lobe causes increased carbon dioxide partial pressure (pCO₂) leading to arterial vasoconstriction and reduced pulmonary perfusion. This causes the vessels in the obstructed region to become narrow and sparse.¹⁰ Fluoroscopy may indicate mediastinal shift and paradoxical movement of the diaphragm^{9,10} but may only have a place where bronchoscopy is not immediately available. Three-dimensional computed tomography (CT) and virtual bronchoscopic reconstruction can accurately localise foreign bodies and aid planning for bronchoscopic removal.¹¹ In all cases of a clinical suspicion of inhaled foreign body, definitive investigation and management must be performed even where radiological findings are normal, and radiological investigation should not delay definitive therapy.

Rigid bronchoscopy is the gold standard for the diagnosis and definitive management of inhaled foreign bodies and should be performed should any one of the diagnostic modalities (history, physical examination or radiography) point towards the possibility of an inhaled foreign body.^{5,8,9,12} Bronchoscopy is positive in the vast majority of cases with a classic history but also in 28% of those with negative history but with other indications for the procedure.³ Success rates for extracting foreign bodies are excellent in many centres around the world.^{1,3-5,7,12} Occasionally flexible bronchoscopy can access subsegmental bronchi beyond those reached by the rigid bronchoscope. There is a low incidence of complications from bronchoscopy⁵ although when complications occur they may be significant and may occur even in experienced hands, especially when the foreign body is located in distal areas.³ Repeat bronchoscopies may be necessary in approximately 7% of patients.⁶ Surgical bronchotomy or segmental resection may be necessary if bronchoscopy is unsuccessful.

Immediate diagnosis and management of foreign body aspiration are vital to prevent airway complications, including atelectasis, pneumonia, pyo- or pneumothorax, granulation tissue formation, haemorrhage and death. Any pointers towards possible foreign body aspiration on history, examination or radiology should prompt further investigation. In cases where the diagnosis is not made immediately, changing clinical and radiological features must trigger consideration of a foreign body, especially if these changes occur quickly.¹³

Lessons from this case

There were features of this case that would certainly point to a diagnosis of pre-existing asthma with an acute exacerbation; however there were also many atypical features.

There was a history of recurrent asthma symptoms, a positive family history and a diagnosis of asthma at primary care level. The initial history of the episode was of a sudden onset of tight chest and wheezing which had been preceded by an upper respiratory tract infection. Clinical signs compatible with the diagnosis of asthma included difficulty in breathing, requiring use of accessory muscles, audible wheezing, a hyperinflated chest and a pulsus paradoxus. In addition, the chest X-ray on admission showed hyperinflation with only subtle difference in left and right lung expansion.

Clues to an additional diagnosis were present even initially. Although asthma can present with decreased air entry in severe cases, this is usually bilateral; the so-called 'silent chest', and unequal air entry is uncommon. The presence of cyanosis is a common presentation in inhaled foreign bodies, especially those in which there is delay in diagnosis.⁵ In addition, the majority of acute asthmatic attacks respond well to treatment and in this case there was a minimal (and inconsistent) response to appropriate asthma treatment.

The second chest X-ray (Fig. 2) shows marked hyperinflation of the right lung with depressed hemidiaphragm, mediastinal shift and hyperlucency, all classic signs of incomplete large airway obstruction. Even though the X-ray is slightly rotated which could account for some of the lucency on the right, this cannot account for the extent of the lucency or the other X-ray features.

The change in the patient's clinical signs, with the sudden occurrence of stridor and respiratory compromise,

associated with unilateral decrease in air entry triggered direct questioning of the mother about the possibility of inhaled foreign body and confirmation of a typical history. However significant delay occurred before the diagnosis was made.

Aspirated foreign body is an important differential diagnosis for asthma and should also be considered in the child with established asthma who has an exacerbation that does not respond to standard treatment.

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