

Long-standing aspirated foreign body in a child complicated by pneumothorax and empyema

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ABSTRACT

Foreign-body aspiration is a common paediatric emergency requiring immediate recognition and management. We report a case of a four-year-old boy who presented to the Emergency Department at Al Sabah Children's Hospital in Juba, South Sudan, with a two-month history of an inhaled foreign body (bead). He had previously attended several healthcare facilities with recurrent chest infections that led to acute respiratory distress. On admission, he was managed for respiratory failure, severe aspiration pneumonia, pleural empyema/lung abscess, and pneumothorax. Despite the prolonged aspiration and a prior unsuccessful bronchoscopic retrieval attempt, the foreign body was expelled after back blows. The child developed complications necessitating chest tube thoracostomy, prolonged intravenous antimicrobial therapy, oxygen supplementation, and anti-tuberculosis treatment. His clinical condition gradually improved. Prevention of foreign-body aspiration in children requires restricting access to high-risk choking objects and providing age-appropriate feeds.

Keywords: foreign body aspiration; recurrent respiratory tract infection; aspiration pneumonia; pneumothorax; paediatric emergency; South Sudan.

Introduction

Foreign-body aspiration is a common paediatric emergency and an important cause of accidental mortality among children in the home setting.^[1-3] Early diagnosis and immediate intervention are essential in preventing serious morbidity and mortality. Rigid bronchoscopy is the gold-standard treatment for paediatric tracheobronchial foreign bodies.^[4] The condition occurs most commonly in young children, who commonly place small objects in their mouths and may talk, laugh, or play while eating.^[5]

Clinical manifestations depend on the size, nature, and anatomical location of the aspirated foreign body. Patients may remain asymptomatic or present acutely with coughing, choking, respiratory distress, asphyxia, or acute respiratory failure.^[6] Delayed or subacute presentations may include recurrent pneumonia, persistent cough, haemoptysis, lung abscess, or chronic respiratory tract infection. Diagnostic evaluation includes chest radiography, computed tomography (CT), microlaryngoscopy, and bronchoscopy.^[7]

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Preventive strategies include avoiding high-risk choking hazards such as whole nuts, beads, coins, and pen caps, as well as ensuring age-appropriate feeding practices.^[5,8] Manufacturers should also provide clear warning labels for products that may pose aspiration hazards to children. Public health education and caregiver awareness remain crucial components of prevention.^[5,9]

We report a case of a four-year-old boy who presented to the Emergency Department at Al Sabah Children's Hospital in Juba, South Sudan, with a two-month history of an inhaled foreign body (bead).

Case Report

A four-year-old boy presented on 19 February 2024 to the hospital with a two-hour history of severe respiratory distress and gasping. Two months previously, he had aspirated a small object, possibly a bead, and immediately had choking that persisted for several days. Subsequently, he developed recurrent and worsening cough, chest pain, and fever. There was no history of haemoptysis or wheezing. Symptoms worsened when lying on the right side and were not relieved by any specific measures. Additional history revealed poor appetite and progressive weight loss.

The child had attended multiple healthcare facilities prior to presentation. Several attempts to remove the foreign body had been unsuccessful, including an otorhinolaryngological procedure (bronchoscopy). His condition acutely deteriorated, necessitating emergency admission to Al Sabah Children's Hospital. An initial chest X-ray performed on 23 December 2023 showed a foreign body in the bronchus and perihilar lymphadenopathy (Figure 1).

On examination, the child was semiconscious with a Glasgow Coma Scale (GCS) score of 10/15. He appeared cachectic and was in severe respiratory distress, characterised by nasal flaring, marked subcostal and intercostal recessions, and gasping respirations. Oxygen saturation was 42% on room air, pulse rate of 180 beats/minute, and temperature of 39.0°C. There was no digital clubbing or peripheral lymphadenopathy.

Respiratory examination revealed reduced movement of the right hemithorax with tracheal deviation to the left. Percussion demonstrated stony dullness over the right hemithorax, while auscultation revealed absent breath sounds over the right lung field. Fine crackles were heard over the left lung field without wheezes. Cardiovascular examination was unremarkable apart from sinus tachycardia. Abdominal examination was normal, and no focal neurological deficits were identified aside from the reduced GCS score.

Laboratory investigations demonstrated malaria parasitaemia (++) (*Plasmodium falciparum*), total white blood cell count of $23 \times 10^9/L$, predominantly granulocytes, platelet count of $400 \times 10^3/\mu L$, and haemoglobin concentration of 8.4 g/dL.

The child was managed for severe pneumonia/aspiration pneumonia complicated by impending respiratory failure and malaria. The medical doctor in charge positioned the child prone in a head-down position across his lap and administered four back blows using the heel of the hand. The child was subsequently repositioned into the right lateral position. Oxygen supplementation at 6 L/minute was initiated together with an intravenous bolus of 10% dextrose (60 mL) for presumed hypoglycaemia and intravenous hydrocortisone 25 mg every six hours. Shortly thereafter, the child expelled the foreign body

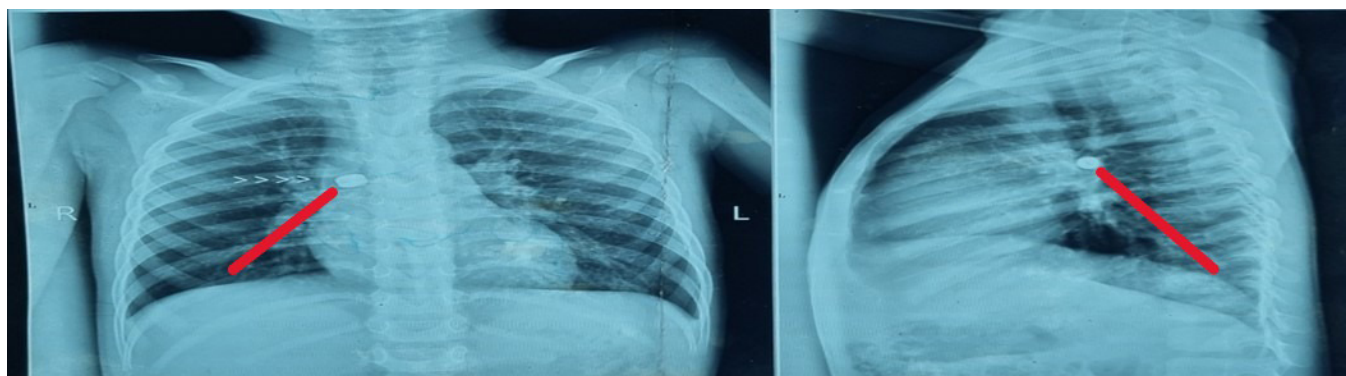


Figure 1. Initial chest X-ray done on 23/12/2023. Foreign body in the bronchus and perihilar lymphadenopathy. (Photo Credit: Juma Santino)

(Figure 2). Additional treatment included intravenous ceftriaxone 1,125 mg once daily for three days, intravenous artesunate 30 mg every 12 hours for three doses, followed by daily dosing for two days, and subsequent artemether-lumefantrine syrup therapy.

Several hours following expulsion of the foreign body, the child developed intermittent high-grade fever, dyspnoea, chest pain, and persistent cough. Oxygen saturation fluctuated between 85% and 92% despite oxygen supplementation at 6 L/minute during the first days of admission.

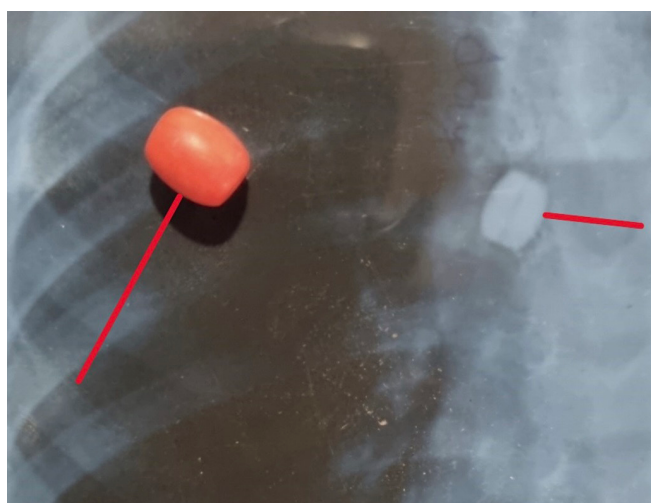


Figure 2. Photo of the foreign body (red bead) after expulsion from the lungs. The same bead is also identified by X-ray (white) prior to expulsion from the lung. (Photo Credit: Juma Santino)

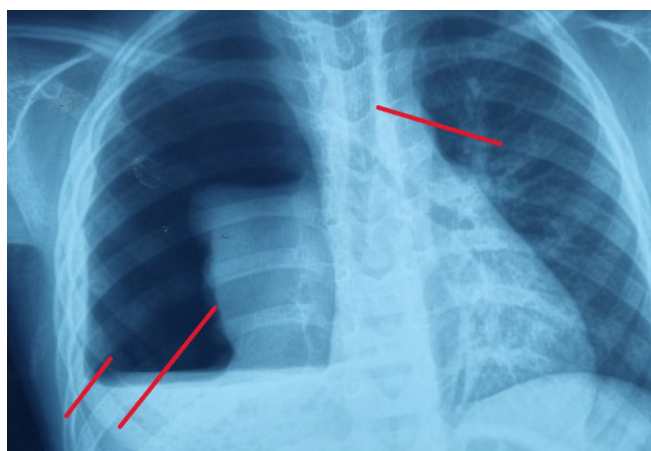


Figure 3. Right-sided pneumothorax, displaced trachea to the left, collapsed lung, and right-sided pleural effusion/lung abscess. (Photo credit: Dr. Juma Santino)

On the third day of admission, the child's clinical condition deteriorated further, with severe respiratory distress (respiratory rate 66 breaths/minute), pallor, and oxygen saturation of 76% on room air. Temperature was 39°C and pulse rate 156 beats/minute. Repeat respiratory examination demonstrated persistent tracheal deviation to the left and absent breath sounds over the right hemithorax. Repeat chest radiography revealed a right-sided pneumothorax associated with lung collapse, pleural empyema/lung abscess, and mediastinal shift to the left (Figure 3).

A chest tube thoracostomy was performed, draining thick yellow purulent fluid continuously for two weeks. Repeat chest radiography necessitated reinsertion of the chest tube, which remained in situ for an additional five days. On the third day of admission, the child was started on intravenous vancomycin 240 mg, diluted in 50 mL of normal saline, every six hours for 14 days; intravenous meropenem 360 mg every eight hours for 14 days; and continued oxygen supplementation. Due to poor clinical response and the local epidemiological context, anti-tuberculosis therapy (RHZE regimen) was initiated on day six of admission. Oxygen therapy was discontinued on day 10.

The patient subsequently demonstrated gradual clinical improvement, characterised by resolution of fever, improvement in oxygen saturation, and reduction in respiratory rate to 25–40 breaths/minute (Figure 4). The chest tube was removed after three consecutive days without drainage, having remained in situ for a total duration of 20 days (Figure 5).

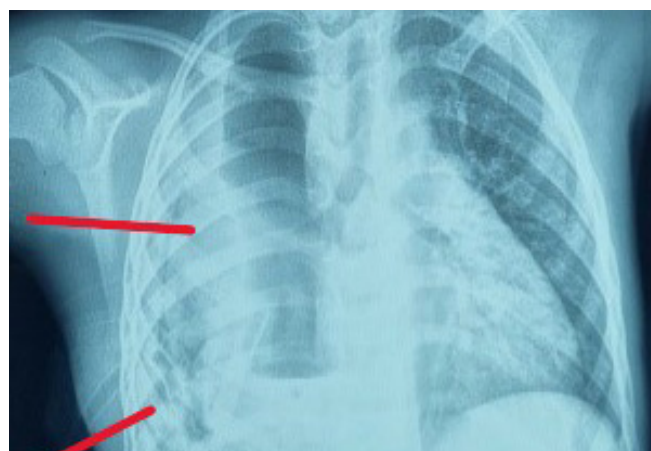


Figure 4. Improved aeration with resolved right-sided pneumothorax and pleural effusion post chest tube insertion. (Credit: Dr. Juma Santino)

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Figure 5 a and b. Locally made underwater seal chest tube. (Credit: Juma Santino)

On discharge, the child was afebrile, breathing comfortably, and maintaining oxygen saturation of 97% on room air. Chest auscultation demonstrated improved air entry in the right upper lung zone, although reduced aeration persisted in the right lower zone. No crackles or wheezes were detected. He was discharged on oral anti-tuberculosis therapy.

Follow-up over six months showed progressive improvement in appetite, weight gain, and respiratory function.

Discussion

Foreign body aspiration is a potentially life-threatening paediatric emergency that requires early diagnosis and timely intervention to prevent severe complications including death.^[1,3] In this case, the child presented two months after aspiration of the foreign body and had undergone multiple unsuccessful attempts at removal, including bronchoscopy. Bronchoscopy poses a great

Table 1. Dos and don'ts when dealing with foreign-body

	Dos	Don't
1	Maintain a high index of suspicion ¹ Infants (under 1 year): Place the baby face-down on your forearm, support the head, and give 5 firm back blows between the shoulder blades. If not relieved, turn the baby face up and give 5 chest thrusts (similar to CPR compressions but gentler). Children above 1 year: Perform the Heimlich manoeuvre	Don't perform blind finger sweeps, Try to remove what you can see ²
2	Perform a thorough physical examination	Don't give bronchodilators (it will not work)
3	Obtain decubitus or expiratory X-rays: Most aspirated objects are radiolucent	Don't rely solely on a normal chest X-ray to rule out aspiration: Up to 30% of patients with confirmed tracheobronchial foreign bodies
4	Keep the patient calm and nil per mouth Agitation can shift a stable bronchial foreign body back up into the subglottic space or trachea, converting a partial obstruction into a catastrophic complete airway obstruction.	Don't delay intervention: organic material (e.g., peanuts, beans) absorbs moisture rapidly, swells to cause worsening obstruction, and releases chemical irritants that lead to severe localized "vegetable bronchitis" and granulation tissue formation within hours.
5	Prepare for rigid/Flexible bronchoscopy	

¹ Sudden coughing, gagging, or choking while eating or playing, difficulty breathing, noisy breathing, or wheezing).

² It may cause trauma, unintentionally pushing the foreign object deeper into the airway, stimulate the person's gag reflex, introducing the risk of aspiration.

challenge even in the hands of the most experienced bronchoscopist or otolaryngologist due to many factors. Among these are the shape and surface characteristics of the bead or other foreign body. Beads are usually smooth, round, and slippery, making them difficult to grasp securely with standard bronchoscopy forceps. Repeated attempts at grasping may cause the bead to slip and migrate distally into smaller bronchi, further complicating retrieval. Large beads may become tightly impacted within the bronchus, making extraction difficult without causing trauma to the airway mucosa. Conversely, very small beads can move deeper into segmental bronchi where visualization and access are limited.

Another significant issue is the presence of a central hole in some beads. During bronchoscopy, forceps may repeatedly slip through or around the hole instead of obtaining a firm grip. Special retrieval instruments such as balloon catheters, baskets, magnets (for metallic objects), or optical forceps may be required for successful extraction. Delayed diagnosis can also contribute to bronchoscopy failure. Although beads do not induce the same inflammatory reaction as organic materials, prolonged retention may still lead to mucosal oedema, granulation tissue formation, secondary infection, and accumulation of secretions around the foreign body. These changes reduce visibility and make retrieval even more challenging.

In some cases, airway oedema, bronchospasm, oxygen desaturation, or bleeding during the procedure may force the surgeon to terminate the bronchoscopy before successful removal to avoid life-threatening complications. Other factors like repeated failed attempts may increase the risk of airway trauma, perforation, or complete obstruction.^[10,11,12]

In this patient, delayed diagnosis and prolonged retention of the foreign body contributed to recurrent respiratory tract infections and severe pulmonary complications, including pleural empyema, lung abscess, pneumothorax, atelectasis, and respiratory failure. Such complications are well recognised in cases of long-standing foreign-body aspiration. In most cases, diagnostic delays were attributed to physician misdiagnosis, failure by parents to seek medical advice, patients left against medical advice, and, in this setting, inaccessibility to specialized care is a challenge.^[6,13]

Children presenting with recurrent or non-resolving respiratory tract infections should always be evaluated for possible foreign-body aspiration, particularly when there is a history of choking. Differential diagnoses of recurrent

respiratory tract infections include bronchial asthma, primary or secondary immunodeficiency disorders, congenital cardiopulmonary anomalies, and genetic predisposition to chronic respiratory disease.^[14,15]

Our patient required prolonged broad-spectrum antimicrobial therapy because of severe secondary pulmonary infection and empyema. Although antibiotics are not routinely indicated in uncomplicated foreign body aspiration, they must be considered in patients presenting with aspiration pneumonia, abscess formation, empyema, or sepsis. Management should therefore be individualised according to the clinical presentation and supported by appropriate microbiological investigations to minimise unnecessary antimicrobial exposure and antimicrobial resistance. Anti-tuberculosis therapy was initiated due to a poor response to broad-spectrum antibiotics and the prevailing local epidemiological context. The child subsequently completed six months of anti-tuberculosis treatment.

Several manoeuvres are available for management of foreign-body airway obstruction in children, including back blows, chest thrusts, abdominal thrusts (Heimlich manoeuvre), Magill forceps extraction, suction-assisted airway clearance devices, and bronchoscopic retrieval.^[16,17] In this case, expulsion of the foreign body following back blows was unexpected, given the prolonged duration of aspiration and previously failed bronchoscopic intervention. Forceful coughing may also have contributed to spontaneous dislodgement of the object.

Prevention of foreign-body aspiration requires a multidisciplinary approach involving caregivers, healthcare workers, manufacturers, and public health systems. Caregivers should be educated not only on appropriate first-aid responses but also on harmful practices to avoid, such as blind finger sweeps, which may inadvertently push the object deeper into the airway. Improved public awareness regarding choking hazards and basic life-support skills could significantly reduce the morbidity and mortality associated with foreign body aspiration (Table 1).^[14,15]

Conclusion

Foreign-body aspiration is a common paediatric emergency that may result in life-threatening complications when diagnosis and treatment are delayed. Complications include pneumothorax, pleural empyema, lung abscess, atelectasis, and respiratory failure. Early recognition, prompt intervention, and appropriate supportive

management are essential for improving clinical outcomes. Public education regarding choking hazards, preventive strategies, and first-aid manoeuvres such as the Heimlich manoeuvre and back blows in young children may contribute significantly to reducing morbidity and mortality in children.

Declarations: Written informed consent for publication of this case report was obtained from the patient's parent.

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