An 11-Month-Old Boy with Cherimoya Seed Foreign Body in Bronchus: A Case Report

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Abstract

Foreign body aspiration is challenging for ORL-HNS specialists. Not only it can be life-threatening, but also it has unnoticed symptoms for several days, weeks or months, but can cause serious sequelae. This article reports a 11-month-old who was referred to the Emergency Care Unit of RSUD Dr Soetomo Surabaya with chief complaints chest pain after choking cherimoya seeds 4 hours earlier after eating cherimoya fruit which given by his mother. He coughed continuously and had short of breath and looked cyanosis on his face. Arrived at our hospital, the patient had loss of consciousness, thus we decide to intubate him. From physical examination we found on auscultation examination there were unilateral wheezing and decreased breath sounds on the right side of the lung. From chest X-ray there is no sign of aspiration pneumonia/atelectasis. After stabilize the patient, we decided to undergo extraction and exploration bronchoscopy using a rigid bronschopy and repeated observation to see the progress.

Keywords. bronchial foreign body, airway obstruction, aspiration

Introduction

Foreign body aspiration continues to be a challenge for ENT specialists, particularly in terms of diagnosis and treatment. This is because foreign body aspiration can be life-threatening, although symptoms may sometimes go unnoticed for days, weeks, or even months, leading to serious long-term complications.[1,2]

It is crucial to promptly establish a diagnosis and subsequently plan for the management of foreign body extraction. In addition, a high level of suspicion for foreign body aspiration is necessary to ensure appropriate therapy is administered to prevent complications.[3]

Case Ilustration

This case report describes an 11-month-old boy named RA, who was brought to the Emergency Room of RSUD Dr. Soetomo, Surabaya, complaining of pain after choking on a cherimoya seed 4 hours earlier. The patient had eaten the cherimoya fruit given by his mother, then choked, experienced persistent coughing, shortness of breath, and was noted to have a bluish face. The child was then taken to Sampang General Hospital, where a chest X-ray was performed, and was subsequently referred to Dr. Soetomo General Hospital. Upon arrival at Dr. Soetomo General Hospital, the patient experienced a decline in consciousness and was admitted to the resuscitation room (RES) of the ER. On physical examination in the ER, the patient was intubated. The ear, nose, and throat examination revealed no abnormalities, but auscultation revealed unilateral wheezing and decreased breath sounds on the right lung side. A chest X-ray (AP/Lat) did not show clear signs of aspiration pneumonia or atelectasis. **(Figure 1)**. The vital signs were as follows: pulse rate of 124 beats per minute, respiratory rate of 24 breaths per minute, body temperature of 36.5°C, and body weight of 11 kg. Neck examination revealed no suprasternal retraction or inspiratory stridor. After the patient stabilized, the management included performing a rigid bronchoscopy for foreign body extraction and exploration. The patient was then observed for further developments.

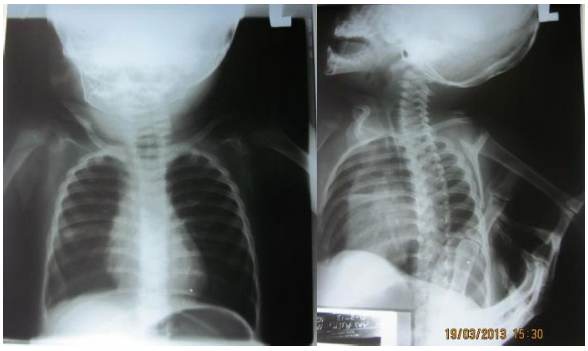

Figure 1. There were no clear signs of aspiration pneumonia or atelectasis. *(author's documentation)*

Preparations for the patient, in addition to the preparation for the rigid bronchoscopy for foreign body extraction and exploration, included the following equipment: ENT laryngoscope, rigid bronchoscope size 3.5 for children, telescope, suction apparatus, forceps, cotton swabs, cotton, and sterile gauze. (**Figure 2**)

Figure 2. Rigid Bronchoscopy Instruments *(author's documentation)*

The foreign body extraction and exploration bronchoscopy procedure was performed in the operating room of the ER at Dr. Soetomo General Hospital, Surabaya, with the assistance of a laryngoscope and an assistant who held the patient's head.

Figure 3. Bronchoscopy extraction and exploration procedures (*authors' documentation*)

The procedure for foreign body extraction and bronchoscopy exploration was performed with the patient in a supine position, held in place with the shoulders at the edge of the table, and the patient intubated and oxygenated. Direct laryngoscopy (by the anesthesia colleague) was performed until the epiglottis (ETT +) was visible. The endotracheal tube (ETT) was then slowly removed, while the laryngoscope was maintained to visualize the glottic opening. A pediatric rigid bronchoscope size 3.5 was held in the right hand and, with the guidance of the laryngoscope, inserted through the glottis at an angle (with the tip pointing to the right), keeping it in the middle position and gently advancing with the left thumb until

it reached the trachea. The laryngoscope was then withdrawn, leaving only the bronchoscope in place. The bronchoscope was held with the left hand, as if holding a pencil, and was gently advanced while being rotated 90 degrees clockwise. It was further advanced into the trachea. Using a telescope, the tracheal walls were inspected by rotating the bronchoscope from one side to the other. The bronchoscope was advanced to the carina, then shifted left, rotated 90 degrees (with the tip pointing right), and advanced until the right main bronchus was visualized. The foreign body, a cherimoya seed, was located in the right bronchus. The foreign body was extracted using forceps, and the exploration continued. To evaluate the right bronchus, the bronchoscope was shifted left and advanced until the right bronchial branch was visible. To evaluate the left bronchus, the bronchoscope was withdrawn to the carina, then shifted right while being advanced until the left bronchus was visible. The trachea, right bronchus, and left bronchus appeared normal, with no lesions or hyperemia. The bronchoscopy procedure was completed.

Discussion

The severity of foreign body aspiration is determined by whether the airway obstruction is complete or partial. Complete airway obstruction occurs in the upper airway, above the carina, at the level of the laryngeal inlet or trachea, and causes acute onset of respiratory distress. In this case, the patient is unable to speak, cough, or cry, and the classic sign is that they reflexively hold their neck by placing the thumb and index finger on their throat. Complete airway obstruction can rapidly lead to death if the foreign body is not dislodged or extracted immediately.[4]

Partial airway obstruction occurs when there is a partial blockage of the airway or when the obstruction is distal to the carina. Symptoms that may occur include coughing, gagging, difficulty breathing, wheezing, or stridor, which appear suddenly. In such cases, attempts to assist the patient may not be needed and could even worsen the situation. For example, techniques like finger sweeps or back blows could convert partial obstruction into complete obstruction. This partial obstruction can persist for weeks or even months after the aspiration, and foreign body aspiration can be diagnosed due to complications such as recurrent pneumonia, persistent cough, hemoptysis, wheezing, or the presence of atelectasis.[4]

After aspiration, a foreign body can be located in three anatomical sites: the larynx, trachea, and bronchi. Approximately 80-90% of foreign bodies are found in the bronchi. In adults, foreign bodies tend to get lodged in the right main bronchus because its diameter is larger than that of the left, the divergence angle of the tracheal axis is smaller on the right side,

the airflow through the right lung is greater than through the left, and the carina is positioned more to the left of the midline.[3,4] However, in children, some literature indicates that the frequency of foreign body aspiration is the same for both the right and left bronchi.[3,4,5,6]

Foreign body aspiration consists of three phases. The initial phase involves choking, a sensation of blockage, gasping, and coughing, or airway obstruction occurring shortly after the aspiration. The next phase is asymptomatic, where reflexes become fatigued and relaxed, leading to a reduction or cessation of symptoms. This phase can last for several hours, days, weeks, or even months. The third phase is the complication phase, where the foreign body can cause symptoms and signs related to its location, such as erosion or obstruction, leading to conditions like pneumonia, atelectasis, or abscesses.[3]

The clinical manifestations depend on the location, size, and shape of the foreign body. Large, sharp, or irregularly shaped foreign bodies tend to lodge in the larynx or trachea and can cause complete airway obstruction due to the size of the foreign body or the edema it induces. Large, round, or expandable foreign bodies will cause total obstruction.[3,4]

When the foreign body is located in the larynx, it can cause paroxysmal coughing, choking, gagging, hoarseness, aphonia, difficulty breathing, inspiratory stridor, respiratory muscle retraction, and cyanosis. When the foreign body is in the trachea, it can cause intermittent coughing, asthmatoid wheezing during expiration, audible slapping sounds in the trachea during coughing or deep inspiration, palpable thuds in the trachea, dyspnea, respiratory muscle retraction, inspiratory stridor, restlessness, and cyanosis.[3,6,7]

When the foreign body is in the bronchus, the typical symptoms include initially non-productive coughing, which may later become productive, unilateral wheezing, and decreased breath sounds on the ipsilateral side. Hemoptysis and chest pain may also occur. Although only 65% of patients exhibit these classic symptoms, in children with new-onset asthma, bronchitis, or pneumonia that does not respond to adequate therapy (such as bronchodilators, steroids, or antibiotics), the possibility of foreign body aspiration should be considered, especially in cases of unilateral wheezing.[3,6,7]

For radiological examination of the neck and chest, it depends on the type of foreign body. If the foreign body is radiopaque, it will be clearly visible. However, most foreign bodies are radiolucent, so indirect radiological findings should be sought, including emphysema, atelectasis, pneumonia, and mediastinal shift.[4,7,9] Radiolucent foreign bodies in the trachea may appear as subglottic opacity or swelling on PA and lateral soft tissue neck X-rays. Foreign bodies in the bronchi may show normal findings on chest X-rays. However, the affected lung may show hyperinflation (obstructive emphysema) and cause a mediastinal shift towards the

unaffected lung on an expiratory chest X-ray. This is due to the ball-valve effect of the foreign body in the trachea. Patients can inspire air through the foreign body, but they experience difficulty during expiration. If atelectasis occurs, the mediastinum will be shifted towards the affected side.[3-5,7-9]

In addition, due to its greater contrast resolution, a CT scan is used to detect radiolucent foreign bodies in the airways that may not be visible on plain X-rays. A CT scan can also identify foreign bodies in the tracheobronchial lumen and provide a three-dimensional view of the foreign body's position within the chest. CT scans are useful for both children and adults with altered consciousness. If a CT scan reveals foreign body aspiration, no further X-rays are necessary, and endoscopy should be performed for definitive diagnosis and therapy. However, the limitation of CT scans is that any process causing obstruction or narrowing of the airway lumen may present similar findings to foreign body aspiration, such as malignancy, granulomatous diseases, mucus plugs, and bronchial stenosis.[3,5,8]

MRI can identify foreign bodies, such as nuts, from granulomas and atelectasis due to their hyperintensity on T1-weighted images. The nut appears with high signal intensity due to its fatty contents, surrounded by the low intensity of lung tissue. The advantage of MRI is that it is non-invasive and does not involve radiation exposure. MRI also provides high-resolution multiplanar images of soft tissues. Its drawbacks include being expensive, requiring longer examination times, and the need for sedation in some patients. Additionally, all metallic objects must be removed from the patient. MRI is particularly useful when no foreign body is found during endoscopic examination but migration is suspected.[3,5,8,10]

For foreign bodies in the trachea and bronchi that do not cause complete obstruction, the foreign body is generally extracted using bronchoscopy under general anesthesia. Emergency extraction is not recommended unless there is airway obstruction or the foreign body is a food item that may expand.[13,14]

In principle, endoscopic evaluation should be performed in patients who have a witness to the time of aspiration, a reliable history of aspiration, a foreign body visible on an X-ray, and classic symptoms and signs of foreign body aspiration.[3,4,9] Similarly, if there is a clear history of suspected aspiration, even if clinical symptoms are absent or not convincing, or if no foreign body is visible on the X-ray but clinical suspicion remains high, endoscopic evaluation should still be considered.[3,14]

The choice between using a rigid or flexible bronchoscope depends on the location and type of the foreign body, the experience of the endoscopist, and the available equipment. Some advantages of using a rigid bronchoscope include better ventilation, which allows for more

controlled airways; a larger internal diameter, allowing for the use of larger instruments; a larger diameter of the rigid telescope, providing a clearer view; and a variety of forceps sizes and types that can be used. Additionally, the foreign body can be partially or completely removed into the lumen of the bronchoscope. On the other hand, when using a flexible bronchoscope, it is recommended that the endoscopist be proficient in both instruments (rigid and flexible). It is also suitable for patients older than 10 years, when the foreign body is not embedded, small, non-obstructive, radiopaque, not sharp, and located in the distal parts. The flexible bronchoscope is typically used for initial diagnosis and is followed by other instruments for further intervention.[1,5,6,9,12]

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