RTBoardReview
Simulation 36 – 18 Month-Old Boy with Cough and Wheezing
Condition/Diagnosis: Foreign Body Aspiration

Take-Home Points

Foreign body aspiration (FBA) is a common medical emergency and the leading cause of accidental deaths in infant and toddlers. Most events occur in those < 3 years old (peaking at 1-2 years of age).

About two-thirds of aspirated foreign bodies in children consist of organic material/food stuff, such as seeds, nuts and candies (peanuts being most common in the US). Because most organic foreign bodies are at least somewhat radiolucent, they may not be detected via standard chest X-ray. Many organic foreign bodies also tend to absorb moisture and swell, thus worsening any initial obstruction. Moreover some organic foreign bodies can cause severe airway inflammation.

Inorganic foreign bodies commonly include teeth, coins, pins, crayons, and small plastic objects, such as small toy parts. Many of these are radiopaque and thus easily visible on X-ray. However, most plastic objects may escape detection on a standard chest radiograph.

Most aspirated foreign bodies end up in the bronchial tree, with the remainder lodging in the larynx or trachea. Although the mainstem bronchi separate at nearly equal angles in small children, foreign bodies are still more likely to lodge in the right mainstem bronchus or its segmental bronchi.

Key points in the assessment and treatment of patients with foreign body aspiration include the following:

Assessment/Information Gathering

- Most children with FBA will have a recent history of a witnessed choking event, i.e., sudden onset of cough and/or dyspnea and/or cyanosis in a previously healthy child
- A child suffering from FBA causing complete airway obstruction will typically be in acute respiratory distress without air exchange (and unable to cough or make sounds), or be unconscious, cyanotic and in respiratory arrest; immediate action is required (see Treatment/Decision-Making)
- Partial airway obstruction is the more common finding in a child suffering from FBA. Signs and symptoms (S&S) vary according to location and time lapse since aspiration:
  - larynx/trachea - acute respiratory distress with stridor, diffuse wheezing, dyspnea, hoarseness, aphony with possibly retractions and cyanosis (must be addressed immediately)
  - large bronchi –choking, persistent coughing, dyspnea, tachypnea, regional decrease in breath sounds with localized/unilateral wheezing (later may include S&S of pneumonia or atelectasis)
  - lower airways – initial choking episode may be followed by a lack of any remarkable signs or symptoms until late phase complications develop, e.g., pneumonia, atelectasis, abscess
- S&S typical of late phase FBA include unilateral decreased breath sounds with course rhonchi, persistent cough and/or wheezing, and recurrent or nonresolving pneumonia
- S&S of FBA can mimic other respiratory problems, such as asthma, bronchitis, croup, and bronchiolitis (presence of unilateral wheezing is a key distinguishing feature)
- You should be highly suspicion of FBA in any child exhibiting these S&S, or one with an asthma-like condition or respiratory tract infection that is unresponsive to usual therapy
- If the child has a fever and FBA is suspected, either the object is causing chemical inflammation or the child has developed a late phase obstructive pneumonia or possible lung abscess
- Recommend a chest X-ray; may appear normal in many patients; common abnormal findings are unilateral air trapping/hyperinflation/obstructive emphysema (best viewed on an expiratory film)
atelectasis with/without mediastinal shift; actual visualization of a radiopaque object is uncommon; late phase findings include lobar pneumonia, consolidation, bronchiectasis or lung abscess

- Left and right lateral decubitus X-rays can be helpful if an expiratory film cannot be obtained (the side with the foreign body usually will not deflate when placed in the dependent position)
- If S&S suggest object in larynx or trachea and child is in no immediate danger, recommend PA + lateral neck X-rays (even if the object radiolucent, subglottic density or swelling may be apparent)
- If X-ray findings reveal no firm evidence of a foreign body in a child with a history of sudden choking and persistent coughing who is clinically stable, recommend further assessment via diagnostic fiberoptic bronchoscopy (proceeding to rigid bronchoscopy for removal if necessary)
- If S&S suggest FBA but bronchoscopy for a foreign body is negative, recommend a CT scan

Treatment/Decision-Making

- Aspirated foreign bodies should be removed as soon as possible as delayed extraction is associated with increased morbidity and mortality
- If obstruction is complete, first attempt to manually dislodge the object (back blows/chest thrusts on infants; Heimlich maneuver if > 1 YO); avoid these methods if child can speak or cough since they may worsen the obstruction
- If obstruction persists after back blows/Heimlich maneuver and a laryngeal object is suspected, recommend immediate laryngoscopy/retrieval with McGill forceps; do not "blindly" sweep pharynx
- If laryngoscopy cannot remove a laryngeal foreign body and complete obstruction/asphyxia persists, recommend emergency cricothyroidotomy
- For a confirmed radiopaque object that appears below the larynx and is causing severe obstruction and/or if X-rays reveal significant air trapping with mediastinal shift, recommend rigid bronchoscopy under general anesthesia
- For patients with persistent symptoms of partial obstruction below the larynx (cough, wheezing, dyspnea, localized decrease in breath sounds/wheezing) or those suspected of FBA but without major symptoms, recommend fiberoptic bronchoscopy to identify the cause and location of obstruction
- If a small/solid object is visualized via fiberoptic bronchoscopy, an experienced operator may be able to remove it via special (urologic) tools that can fit through a pediatric scope’s 1.2 mm working channel; otherwise rigid bronchoscopy will be necessary
- Following successful foreign body removal, the patient should be admitted for observation; recommend short-term treatment with inhaled corticosteroids and bronchodilators if coughing and wheezing persist (usually due to transient bronchial hyperresponsiveness); if increased secretions/bronchorrhea occur, recommend appropriate airway clearance therapy; do not recommend antibiotics unless there is evidence of infection (fever, purulent secretions, increased WBC, etc.)
- All caregivers should be provided with instruction to help prevent FBA, including:
  - avoiding feeding hard and/or round foods to children younger than 4 YO
  - providing adult supervision whenever solid foods are feed to infants/young children
  - always feeding infants in an upright sitting position
  - teaching children to chew their food well and avoid vocalizing or playing while eating
  - avoiding chewable medications until at least 3 YO (development of molar teeth)
  - following age recommendations on toy packages, avoiding any toys with small parts and specifically keeping marbles, small rubber balls, and latex balloons away from children (the leading non-food cause of fatal FBA)
  - being aware of interactions with older children, who may share give dangerous objects
  - taking a course in Basic Life Support and choking first aid
Follow-up Resources:

Useful Web Links:

[http://pediatrics.aappublications.org/content/pediatrics/early/2010/02/22/peds.2009-2862.full.pdf](http://pediatrics.aappublications.org/content/pediatrics/early/2010/02/22/peds.2009-2862.full.pdf)


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