BC Children's Hospital
Division of Pediatric Emergency Medicine
Clinical Practice Guidelines

BRONCHIAL FOREIGN BODIES IN CHILDREN

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FIGURES: ***1***

BACKGROUND:

Aspiration of foreign bodies results in significant morbidity and mortality in children. The majority of foreign body aspirations occur in children less than 4 years of age. Immature dentition, poor food control, activity during feeding, and propensity to explore the environment orally are some of the reasons why children are susceptible to foreign body aspiration.

Completely obstructive laryngeal foreign bodies cause acute respiratory distress and aphonia. Uncut hot dog pieces, grapes, are gel candies such as 'fruit poppers' are common culprits. Retrieval of these objects requires institution of prompt basic life support such as the Heimlich maneuver, retrieval with McGill forceps, and in the older children heroic maneuvers such as cricothyroidotomy.

Aspirated foreign bodies more commonly lodge in the bronchi. Organic matter especially nuts accounts for the majority of aspirated objects. Unpopped popcorn kernels, raw carrots, apples, and peas are also common etiological agents. Inorganic objects such as plastics and metals make up a minority of cases.

Diagnosis of bronchial foreign body aspiration is challenging in children. There are several reasons for the delayed diagnosis. The aspiration event is often unwitnessed or denied by parents. After the initial coughing paroxysm, there often is a quiescent phase for about a week before pneumonia or other complications may occur. Most aspirated objects are radiolucent. Many patients with a bronchial foreign body are asymptomatic. Symptoms, when present, are ubiquitous and often attributed to viral infections or asthma. Many of the symptoms of delayed diagnoses are secondary and therefore may respond to bronchodilators or antibiotics. Every year we encounter several cases of delayed diagnoses in our hospital. A high index of suspicion is required for prompt diagnosis.

PATHOPHYSIOLOGY:

There are three pathophysiologic considerations for aspirated foreign bodies: the anatomy of the lodgment site, the physical properties of the foreign body (size, shape, and composition), and the local tissue reaction to the foreign body. For example, eggshells have a propensity to lodge in the larynx. This is due to the sharp, thin, and firm nature of eggshells making them suitable for lodgment between the vocal cords in the sagittal plane. For purposes of this guideline, we focus on bronchi as the primary anatomical site. The specific physical property of the object and the local reaction determine the risk category of the aspirated foreign body. 'High-risk' objects such as nuts create more morbidity in contrast to the 'low-risk' objects such as cereals.

EVALUATION:

There are three important diagnostic factors that determine the need for bronchoscopy: history, physical examination, and imaging modalities. History of choking is present in 75 to 90% of cases. Obtaining a history of choking therefore is an essential clue to diagnosis of bronchial foreign bodies. Physical examination is nonspecific and often similar to the examination of a child with reactive airway disease. The classic triad of wheeze, cough, and decreased breath sounds occurs in only one-third of all cases affected cases. This triad is more common when diagnosis is delayed. About 20% of patients with bronchial foreign bodies are totally asymptomatic. Inspiratory and expiratory chest radiographs are difficult to obtain in an uncooperative child. Despite this, in some series, up to 80% of retrieved bronchial foreign bodies demonstrated abnormal inspiratory and expiratory chest radiographs. Lateral decubitus chest radiographs and fluoroscopy are rarely used in our institution.

TREATMENT:

The most important element of treatment is prevention. Parents should be warned of the risk of death to young children from uncut hot dogs, uncut grapes, gel candies (a.k.a. fruit poppers), popped balloons and disc batteries. Hot dogs and grapes should be cut into small pieces until a child is at least five years old and has no developmental delay in terms of swallowing. Children should be taught to sit quietly while chewing and swallowing. A child's diet should be advanced slowly in terms of food textures.

Once identified, rigid bronchoscopy is almost always successful in retrieving the aspirated bronchial foreign body. For affected children, care at a tertiary center with a full array of pediatric bronchoscopic and anaesthetic expertise is highly recommended.

COMPLICATIONS:

Atelectasis, pneumonitis, bronchial granulomas, recurrent pneumonias, pneumomediastinum, bronchiectasis, plastic bronchitis, bronchocutaneous or bronchovascular fistulization are among the complications of untreated bronchial foreign bodies.

AIM:

The purpose of this guideline is to establish consistency in evaluation of children with bronchial foreign bodies. The aim is to reduce the morbidity associated with delayed diagnosis of these patients.

INCLUSION CRITERIA:

1) Stable children suspected of unilateral foreign body aspiration

EXCLUSION CRITERIA:

1) upper airway aspirations including laryngeal or pharyngeal aspirations presenting with upper airway obstruction signs and symptoms including stridor, croupy cough, hoarseness, aphonia
2) bilateral bronchial foreign body aspiration
3) clinically unstable children with decreased level of consciousness, airway compromise, respiratory failure (abnormalities of oxygenation and ventilation), and/or shock

KEY POINTS:

1) A history of witnessed episode of choking or acute respiratory distress should elicit suspicion of foreign body aspiration in the clinician.
2) Physical examination of a child with suspected foreign body aspiration focuses on identifying presence of focal wheeze or poor aeration.
3) The primary imaging modality utilized is inspiratory and expiratory chest radiographs looking for air trapping on expiration or unilateral atelectasis (SEE FIGURE 1).
4) Suggestive findings in two out of the three evaluation tools (history, physical examination, and imaging) would implicate involvement of pediatric otolarngologists for bronchoscopy.
5) Suggestive findings in one out of these three evaluation tools would implicate telephone consultation with pediatric otolaryngologists and close follow-up.
6) Equivocal findings in any of these three evaluation tools would implicate close follow-up.

FIGURE 1:

INSPIRATORY VIEW **EXPIRATORY VIEW**

NOTE:

Right side deflates during expiration.
Left side cannot deflate.
There is left-sided air trapping or obstructive emphysema due to partial left mainstem bronchus obstruction.
Mediastinum shifts toward the unobstructed side.
When obstruction becomes complete, then complications such as pneumonia or atelectasis ensue.

See Attached Flowchart.

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