

# Foreign Body Removal

## Airway Foreign Body Aspiration

### **Background:**

Foreign body aspiration is a major source of morbidity and mortality in children below 5 years, with a peak incidence between the ages of 1 and 2 years. Some parents may report witnessing a choking episode, which may have been short-lived and did not consider it significant at the time, therefore delaying presentation and diagnosis. Acutely the child may present with hoarseness, stridor, dyspnea, and unilateral decreased air entry and wheezing on auscultation. However, normal auscultation or physical examination cannot eliminate the possibility of aspiration as 14-45% of patients have a normal physical exam. Overall, the classic triad of cough, wheezing, and decreased breath sounds is present in few than 60% of children with foreign body aspiration. Objects located in the larynx or trachea can be associated with mortality as high as 45%. Partial obstruction by smaller objects may go unrecognized for weeks and may present with recurrent or chronic pneumonias or bronchiectasis. Four major patterns of airway obstruction have been described:

1. Bypass valve obstruction: normal inhalation and exhalation with CXR within normal limits
2. Check valve obstruction: normal inhalation and impedance of exhalation resulting in hyperinflation of the lung field evident and CXR.
3. Ball valve obstruction: partial obstruction which intermittently prolapses and obstructs the affected bronchus. CXR will reveal mediastinal shift toward the involved side with decreased air entry leading to atelectasis and collapse
4. Stop valve obstruction: Complete bronchial obstruction with impedance to air flow during both inhalation and exhalation. CXR reveals segmental collapse in the involved bronchopulmonary segment

### **Anesthetic Considerations:**

The urgency to proceed with anesthesia and bronchoscopic removal is dictated by the severity of respiratory distress and the location of the aspirated material. When possible, removal of the object should be done as an urgent, not emergency, procedure in a well-prepared patient. However remember urgent or emergent need for bronchoscopic examination takes place over NPO status. Routine fasting guidelines should apply if the patient's ventilator status is stable. The presence of an IV catheter before proceeding with surgery allows for administration of an anticholinergic to dry up secretions and prevent vagal response during bronchoscope insertion. Inhalational induction allows the anesthesiologist to avoid positive pressure ventilation and the possibility of moving the foreign body distally. However if it is an emergency and the child has a "full stomach," spontaneous

ventilation will not offer protection against aspiration of gastric contents. However performing a rapid sequence induction would not be advocated which can lead to necessity of positive pressure ventilation and airway obstruction.

**Induction:**

Inhalation induction vs. IV induction keeping the patient spontaneously breathing, titrating to RR 12-16 or 50% of baseline before stimulation of the child.

**Maintenance:**

Once the patient has been induced, the head of the table is rotated 90 degrees and the surgeon will take over the airway. Once the ventilating scope is inserted in the subglottic area, the anesthesia circuit is connected to allow oxygen delivery and positive pressure ventilation if necessary. Ideally, spontaneous ventilation should be preserved at least until the nature and location of the foreign body has been identified. However one must always be aware that the position of the foreign body may change intraoperatively. For maintenance the total intravenous technique is preferred because it is an uninterrupted source of general anesthesia. The anesthesiologist may give gentle positive pressure breaths to determine if adequate chest rise occurs and does not cause airway obstruction, if this is deemed possible one may decide to use muscle relaxation for the procedure. If the decision is made to avoid muscle relaxants, a deep level of anesthesia is required to permit bronchoscopy without coughing. The use of nitrous oxide is contraindicated because if significant air trapping is present, nitrous oxide could increase the gas volume and pressure in the affected lung.

**Extubation:**

The bronchoscope often must be reinserted several times before the foreign body and secretions are successfully removed, which may produce mucosal edema and respiratory distress. Administration of steroids (dexamethasone 0.5-1.5 mg/kg, humidified oxygen, nebulized racemic epi, and rarely tracheal re-intubation for 1-2 days may be required. Have this consideration in mind when planning to extubate after removal of airway foreign body. After completion of the bronchoscopic procedure, the child is usually intubated to allow for definitive airway control as well as tracheal and esophageal suctioning. In general, the child can be promptly extubated once appropriate criteria are met.

**Esophageal foreign body**

Endotracheal intubation and airway protection should precede foreign body extraction. Inadvertently dropping an esophageal foreign body into an unprotected larynx can cause a disaster. NPO guideline may usually be maintained and therefore rapid sequence induction is not necessary. IV medications are the most common form of induction; with the use of muscle relaxant is patient dependent.

**References:**

Gregory, George A. *Gregory's Pediatric Anesthesia*. Hoboken: Blackwell Publishing Ltd, 2012. p792-795.

Hines, Roberta L. *Stoelting's Anesthesia and Co-Existing Disease*. Philadelphia: Elsevier Saunders, 2012. p618-619.