ESOPHAGEAL FOREIGN BODY

Surgical Specialty:	Pediatric Surgery or Gastroenterology
Authors:	Kamie Yang, M.D., University of Michigan, Ann Arbor, MI

Background:

- General Considerations
  - Esophageal foreign body (EFB) ingestions typically occur in children 6 months to 5 years old. Most EFBs will pass through the entire gastrointestinal (GI) tract spontaneously. Only 10-20% of EFBs require endoscopic removal, and about 1% require surgical intervention. The most common EFB are coins.[1]
  - EFB can cause mechanical airway compression if lodged at the level of the cricoid cartilage or the carina, especially in small children.
- Associated Comorbidities/Syndromes
  - Esophageal impaction of food may result from eosinophilic esophagitis and other esophageal dysmotility disorders (i.e., repaired esophageal atresia, post-Nissen fundoplication, etc.). Attention to increased aspiration risk is important in this population.
- Button battery EFB can quickly result in significant morbidity and mortality. They require emergent removal, ideally in < 2 hours after impaction. Do not wait for the patient to be adequately NPO before proceeding to the OR. [2,3,4]

Anesthetic Planning:

- Pre-Anesthetic Evaluation: The urgency of the procedure is influenced by the nature of the object impacted in the esophagus. Obtain H&P/PMH/Anesthetic history as clinically appropriate.
  - **Button batteries: A true emergency that requires emergent removal**.
    - Electrical currents generated from contact of the impacted battery with esophageal mucosa can result in full-thickness esophageal injury within 2 hours of impaction. [2,3,4]
    - Esophageal perforation can progress to erosion into adjacent structures, including the airway, vasculature, mediastinal structures (including recurrent laryngeal nerve), and spinal cord.
    - Eighty percent of fatalities due to button battery EFB are due to hemorrhage, with aortoesophageal fistulas being the most common cause.[5] Evaluate for GI bleeding prior to presentation.
    - Esophageal perforation with erosion into adjacent structures is usually associated with impaction >12-24 hrs.[3]

- Due to the persistently high pH at the site of impaction, esophageal damage may continue for days, even after battery removal. Current recommendations are to irrigate the esophagus with a dilute acidic solution (acetic acid 0.25%) to neutralize residual alkalinity after battery removal.[5]

- New guidelines were published by the National Capital Poison Control Center in 2018. (https://www.poison.org/battery/guideline; hotline for clinicians 1-800-498-8666).[5] Children older than a year of age with suspected lithium button battery ingestion within the last 12 hours should be administered 2 tablespoons of honey (up to a maximum of 6 doses) en route to the hospital to neutralize the strong alkali reaction. **Sucralfate suspension may** also be administered by emergency department personnel. Emergent endoscopic removal is critical to avoid ongoing damage to the esophageal mucosa. **EFB removal should not be delayed waiting for the patient to be adequately NPO**.[2,3,4]

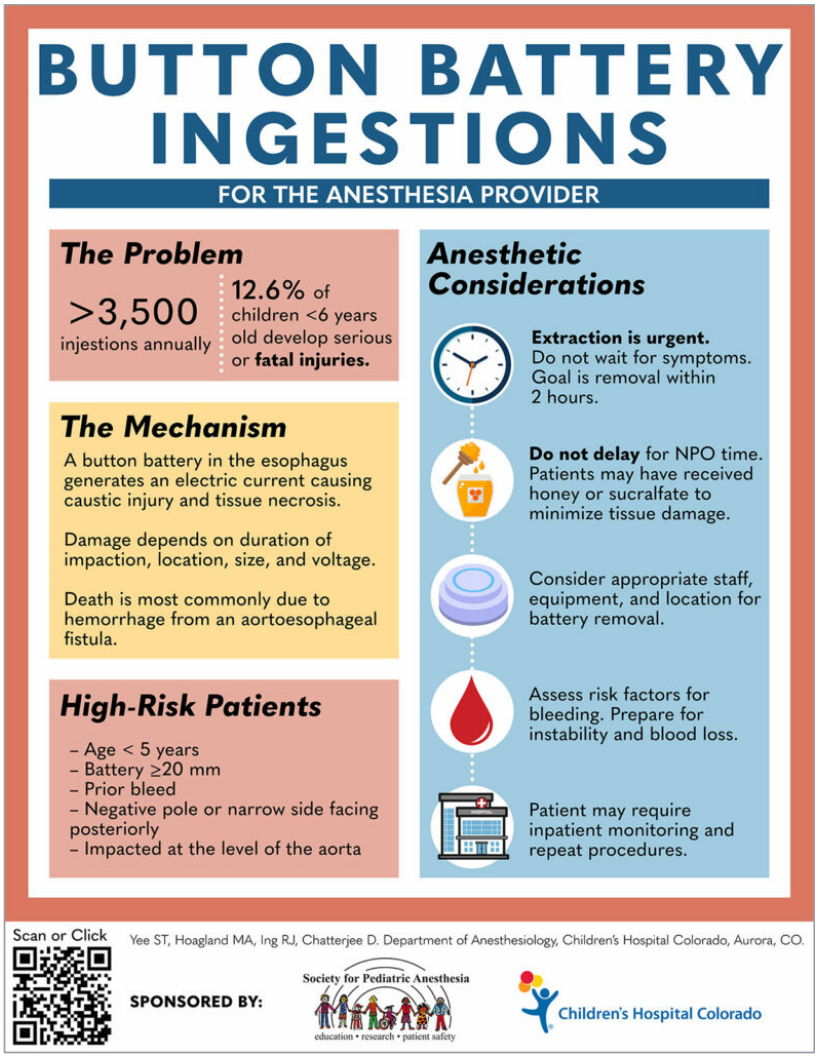

Figure 1: Infographic describing the management of button battery ingestions for anesthesia providers. Used with permission from authors.[2]

- **Concerning Objects/Urgent Removal** (likely proceed prior to adequate NPO status)
    1. **Sharp objects:** EFB with sharp ends (e.g., toothpick, fish bone) are more likely to cause esophageal injury and should be removed urgently.
    2. **Magnets:** Ingestion of multiple magnets can cause bowel wall entrapment, resulting in perforation. They should be removed urgently prior to progression into the bowel.
    3. **Objects causing airway obstruction:** EFB in small children can result in airway compromise, which may necessitate urgent removal of the object.

- **Benign objects** (e.g., impaction of bluntly shaped food, etc.)
    - If the ingested object is benign and not causing symptoms of airway obstruction, it is reasonable to wait for proper NPO status prior to removal.
    - In non-emergent removals, consider repeating the CXR if several hours have elapsed since the initial radiographic diagnosis to evaluate for the migration of the EFB into the stomach. This may negate the need for removal of the EFB in the operating room.

- Discussions to have with surgeon/family
    - Estimate the approximate time of EFB ingestion. Difficulty with removal and complications increase with increasing duration of EFB impaction.

- Specific or Unique Room Set-Up Requirements
    - Airway: General endotracheal anesthesia (GETA)
    - Monitors: Standard American Society of Anesthesiologists monitors
    - Blood Availability:
        - Typically, not indicated, unless concerns for button battery ingestion and GI bleeding due to esophageal-vascular fistula is high.
    - PICU Bed Availability:
        - Typically, not indicated, unless complications of EFB are suspected. Button battery ingestions also require close postoperative monitoring for signs of continued injury progression.
    - Other Indicated Resources:
        - Magill forceps readily at hand
    - **Special case of button battery foreign bodies:**
        - In cases of button battery EFB, esophageal-vascular fistula can result. Hemodynamic instability may be present preoperatively. Consider placing an arterial line, obtaining large bore IV access, and arranging for PRBC to be available. Sentinel bleeds are common before marked hemoptysis. Massive transfusion may be needed. Blakemore tubes have been used as temporizing measures in reported cases.

Intraoperative Considerations:

- General
    - Weigh the risk of aspiration vs. complications from prolonged EFB impaction or airway obstruction.
- Induction:
    - If the EFB requires urgent removal prior to adequate NPO, consider performing a rapid sequence induction (RSI) to facilitate endotracheal intubation.
    - If the EFB is benign, consider waiting for the patient to meet NPO criteria. However, due to trapping of secretions and food above the EFB and possible underlying esophageal dysmotility disorders, the patient may still be at an increased risk of aspiration. Consider the need for RSI vs. modified RSI.
    - Intubate, tape ETT contralateral to where the endoscope will be inserted
    - Avoid cricoid pressure if the EFB is at the level of the cricoid cartilage, especially if the object is sharp and at risk of being lodged further into the esophageal wall.
    - Avoid blindly suctioning the stomach to avoid injuring friable esophageal tissue.
    - Have Macgill forceps ready to grasp object during intubation, especially if a high location of EFB is suspected. Consider securing the airway first prior to manipulating EFB if risks of airway loss are felt to be high.
    - Consider dexamethasone to decrease swelling in cases where airway impingement by EFB or rigid bronchoscope is suspected.
- Positioning: Supine
- Maintenance: Typically, with volatile anesthetic.
- Hemodynamic/Physiologic goals: per routine.
- Surgical Considerations: Rigid esophagoscope can compress trachea, making ventilation difficult. Consider ventilating by hand and hold onto ETT to avoid inadvertent extubation during esophagoscope manipulation. Objects larger than the esophagoscope diameter will require removal of the forceps, EFB, and esophagoscope together. Repeat esophagoscopy should also be performed to assess for mucosal injury. Airway evaluation may also need to be performed if there are any clinical concerns for airway injury.
- Emergence/Disposition: Consider carefully placing an orogastric (OG) tube to evacuate the stomach and extubate the patient when fully awake.
- Post-op Care: per routine, unless complications present.

Case Specific Complications/Pitfalls

- Possible Complications: Complication rate is greater if treatment is delayed and EFB is a button battery or other concerning object.
    - Esophageal injury (ranges from mild abrasions to necrosis and perforation into adjacent structures)
        - Pneumothorax (watch for signs and symptoms. Pneumothorax requiring decompression is rare)
        - Tracheoesophageal fistula (additional intraoperative airway evaluation may be necessary, watch for problems with PPV)
        - Vascular injuries (aorto-esophageal fistula possible, be prepared for possible massive hemorrhage).
    - Airway obstruction or swelling
        - Mechanical compression and swelling of the airway due to EFB impaction or esophagoscope manipulation.

- Vocal cord paresis due to erosion into the recurrent laryngeal nerve with button battery EFB.

References:

[1] Gurevich Y et al. Foreign body ingestion in pediatric patients. Current Opinion Pediatrics. 2018; 30(5):677-682 PubMed Link

[2] Yee, MH et al. Perioperative Management of Button Battery Ingestions in Children. APSF Newsletter. 37(1) 9-11. https://www.apsf.org/article/perioperative-management-of-button-battery-ingestions-in-children/2022. Published Feb 2022. Accessed Aug 8, 2022.

[3] Eck JB, et al. Anesthetic Implications of Button Battery Ingestion in Children. Anesthesiology. 2020;132(4): 917-924. PubMed Link

[4] Ing RJ, et al. The anesthetic management of button battery ingestion in children. Can J Anaesth. 2018; 65:309–18 PubMed Link

[5] National Capital Poison Center. Button Battery Ingestion Triage and Treatment Guideline. https://www.poison.org/battery/guideline. Updated Jun 2018. Accessed Aug 8, 2022.

Reviewed by:

Reviewer #1: Alina Lazar, M.D., Lurie Children's Hospital

Reviewer #2: Audra Webber, M.D., University of Rochester

Reviewer #3: Joseph Sisk, M.D., FAAP, University of North Carolina

Created: 8/14/22; Last revised: 11/18/2024