AMSER Case of the Month

February 2026

10-year-old female with presenting to the ED from an outside hospital following accidental foreign body (plastic water bottle cap) ingestion

Michael Dubinski (MS4), Cooper Medical School of Rowan University

Erica Poletto MD, Cooper University Hospital Radiology

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Patient Presentation

- A 10-year-old patient presented to an outside hospital with the sensation of a foreign body in her upper throat/esophagus, drooling, and decreased oral intake shortly after accidentally swallowing a plastic water bottle cap.
  - HPI was negative for secretion intolerance, dyspnea, chest pain, emesis, hematemesis, or hemoptysis.

- Lateral neck, frontal chest, and frontal + lateral abdominal radiographs were unremarkable at the outside hospital (no radiopaque foreign body nor any acute cardiopulmonary abnormalities were discovered).

- Due to the persistence of symptoms, she was brought by her mother to our institution that same day for further management.

- On arrival to our ED, the review of symptoms was positive only for dysphagia. Vital signs and physical examination were all within normal limits.

- Frontal + lateral chest and frontal + lateral neck radiographs were repeated and once again did not clearly show evidence of a radiopaque foreign body.

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Labs

- Basic metabolic panel and complete blood count results were all within normal limits.

What Imaging Should We Order?

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Select the Applicable ACR Appropriateness Criteria

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Dysphagia

Variant 1: **Oropharyngeal dysphagia with an attributable cause. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
Fluoroscopy barium swallow modified	Usually Appropriate	☢☢☢
Fluoroscopy pharynx dynamic and static imaging	May Be Appropriate	☢☢☢
Fluoroscopy biphasic esophagram	May Be Appropriate	☢☢☢
Fluoroscopy single contrast esophagram	May Be Appropriate	☢☢☢
CT neck and chest without IV contrast	Usually Not Appropriate	☢☢☢☢
CT neck and chest with IV contrast	Usually Not Appropriate	☢☢☢☢
CT neck and chest without and with IV contrast	Usually Not Appropriate	☢☢☢☢
Esophageal transit nuclear medicine scan	Usually Not Appropriate	☢☢☢

This imaging modality was ordered.

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Findings - Unlabeled

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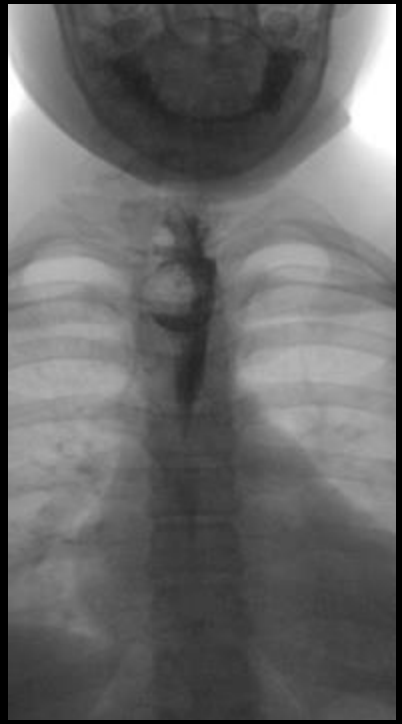
Findings - Unlabeled (Cont'd)



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Findings - Labeled

On retrospective review, however, one may note a rounded esophageal lucency that matches the foreign body location confirmed later by esophagram.

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Official Result: No evidence of foreign body or any acute cardiopulmonary abnormalities.

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Findings - Labeled (Cont'd)

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***Official Result*: No evidence of foreign body. No acute cardiopulmonary nor abdominal abnormalities.**

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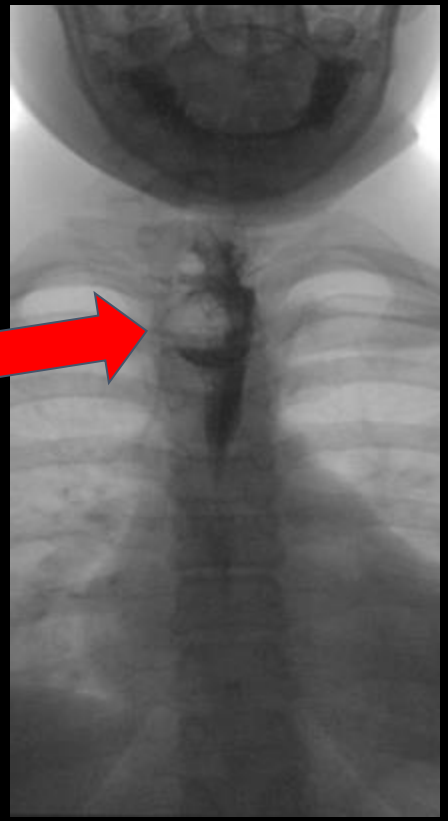
Findings - Labeled (Cont'd)

- ***Round filling defect within the upper thoracic esophagus, without any evidence of contrast obstruction nor extravasation.***

- ***Consistent with her history of accidental plastic cap ingestion.***



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Summary of Hospital Course

- ENT was consulted and performed a bedside nasopharyngolaryngoscopy, which also did not reveal any foreign body.
- She was admitted and made NPO for an esophagram the next morning, which revealed the plastic cap in the upper thoracic esophagus.
- A few hours later, she was taken to the OR for successful removal of the foreign body via esophagoscopy.
- She was discharged on post-op day 1 with a seven-day regimen of prophylactic PO Augmentin and was tolerating PO intake well upon leaving.

Final Diagnosis:

Retained non-radiopaque foreign body within the upper thoracic esophagus

Case Discussion

Diagnostic Approach to Suspected Pediatric Foreign Body Ingestion:

1. Verify that the patient is stable and that the airway is intact. If the airway is compromised, consult Anesthesiology or ENT for emergent removal.[1,2]

2. Obtain radiographs of the neck, chest, and abdomen (including lateral views).
   - Of note, this initial recommendation is not from the ACR Appropriateness Criteria. Rather, it stems from guidelines of several other societies (e.g., NASPGHAN, ASGE, ESGE, etc.).[1-3]

3. If negative radiographs but continued clinical suspicion → esophagram → CT neck/chest if previous study is inconclusive or there is suspected perforation → endoscopy (diagnostic and therapeutic; timing varies based on clinical severity).[1-5]

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Case Discussion (Cont'd)

Radiographic Limitations and the Role of Contrast Studies in Pediatric Foreign Body Ingestion

- Radiographs correctly detect about 64-90% of ingested foreign bodies.
  - However, certain objects are radiolucent and typically do not appear on radiographs, including plastics, thin metals, wood, and many foods.[4,5]

- Therefore, when clinical suspicion persists, negative radiographs do not rule out a foreign body. The work-up should progress to a contrast esophagram and, if inconclusive or pneumomediastinum was found on initial radiographs, a CT scan of the neck and chest should be considered.
  - CT is actually more sensitive, approaching 90-100%, than esophagrams for detecting radiolucent foreign bodies (and have the additional benefit of evaluating complications like perforation/pneumomediastinum).
    - Esophagrams, with traditionally lower overall radiation doses, are still preferred in pediatrics. However, in adult cases of radiolucent foreign body ingestion, CT scans generally replace esophagrams in the work-up.[1-5]

- For contrast esophagrams, barium is often the first line contrast agent adminstered to maximize the sensitivity for detection of foreign bodies, but water-soluble contrast can also be used.
  - **Caution #1** - Using barium directly before endoscopy can limit endoscopic visualization.
  - **Caution #2** - If pneumomediastinum/perforation on initial radiographs, or mediastinal widening that is concerning for mediastinitis, use water-soluble contrast first as barium will not be resorbed from the mediastinal soft tissues and has been linked to rare but serious inflammatory reactions.[1-5]

Case Discussion (Cont'd)

Management of Pediatric Retained Esophageal Foreign Body

- Consult the appropriate specialty (ENT, GI, surgery, etc.).
- Urgency of removal depends on the severity of symptoms as well as the type of foreign body present, as follows:
  - ***No Removal or Elective Endoscopic Removal*** - The patient has no symptoms and the object is small, smooth, and likely to pass spontaneously.
  - ***Urgent Endoscopic Removal (< 24 Hours)*** - The patient continues to experience dysphagia (even without evidence of true obstruction) or there is a blunt or radiolucent object that remains lodged.
  - ***Emergent Endoscopic Removal (< 2 Hours)*** - The patient's airway is compromised, drooling heavily and unable to handle secretions or the patient ingested sharp objects, button batteries, or multiple magnets.
- Although endoscopic removal is generally preferred, there are a few other possible alternatives:
  - ***Endoscopic Push Technique*** - Can be attempted with small, blunt, smooth objects (for example, food boluses) that are in the distal esophagus and involves advancing the foreign bodies into the stomach for eventual spontaneous clearance.
  - ***Surgical Removal*** - If endoscopy fails or there are complications such as esophageal perforation or abscess, surgical incision through the neck or chest may be necessary.[1,2,5]

References

1. Kramer RE, Lerner DG, Lin T, et al. Management of ingested foreign bodies in children: a clinical report of the NASPGHAN Endoscopy Committee. *J Pediatr Gastroenterol Nutr*. 2015;60(4):562-574. doi:10.1097/MPG.0000000000000729

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3. Guelfguat M, Kaplinskiy V, Reddy SH, DiPoce J. Clinical guidelines for imaging and reporting ingested foreign bodies. *AJR Am J Roentgenol*. 2014;203(1):37-53. doi:10.2214/AJR.13.12185

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5. Birk M, Bauerfeind P, Deprez PH, et al. Removal of foreign bodies in the upper gastrointestinal tract in adults: European Society of Gastrointestinal Endoscopy (ESGE) Clinical Guideline. *Endoscopy*. 2016;48(5):489-496. doi:10.1055/s-0042-100456

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