Management of Foreign Body Ingestion

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Epidemiology

• 100,000 cases/year in the US
• 80% in children, mainly 6m – 5 years
• High Risk Populations
  – Edentulous patients, inebriated patients, prisoners, or patients with psychiatric disorders or developmentsl delay (often multiple objects or repeated events)
• 10-20% require endoscopic removal (<1% surgical)
• 1500 deaths/year
Case 1

- 66 yo male presents with difficulty swallowing after eating chicken the night before
- Has been having difficulty swallowing pills for several months
- No weight loss, nausea, vomiting, pneumonia
- PMH
  - HTN, CAD
- Medications
  - isosorbide, NTG, lisinopril
Case #1

• Differential Diagnosis?
Case #1

• Differential Diagnosis
  – Peptic stricture
  – EAC
  – Shatzki’s ring
  – Achalasia
  – Motility disorder
Case #1

• Next step?
Background

- Accidental foreign body
  - Children
  - Edentulous
  - Mentally impaired
  - Elderly subjects
- Intentional Ingestion
  - Psychiatric patients
  - Prison inmates
  - “Body Packers”
Background

• Food (typically meat) bolus impaction above a pre-existing esophageal stricture or ring is by far the most common cause of esophageal body obstruction in adults.
• Bones (chicken/fish), dentures, medication packaging, batteries and coins are uncommon in adults.
• Coins are the most common foreign body in children (76% in one large series).
Background

- Structural and functional esophageal abnormalities increase the risk of foreign body/food impaction in the esophagus
  - Diverticulae
  - Webs/rings
  - Strictures
  - Achalasia
  - EoE
  - Esophageal or GEJ Tumors
<table>
<thead>
<tr>
<th>Location</th>
<th>Frequency</th>
<th>Predisposing condition</th>
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<td>Proximal one-third</td>
<td>Rare</td>
<td>Central nervous system lesions</td>
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<td></td>
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<td>Zenker's diverticulum</td>
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<td></td>
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<td>Cervical web</td>
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<td>Middle one-third</td>
<td>Frequent</td>
<td>Cancer (primary or extrinsic)</td>
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<td>Eosinophilic esophagitis</td>
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<td>Radiation stricture</td>
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<td>Traction esophageal diverticula</td>
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<td>Spastic dysmotility</td>
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<tr>
<td>Distal one-third</td>
<td>Common</td>
<td>Peptic stricture</td>
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<td></td>
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<td>Eosinophilic esophagitis</td>
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<td>Esophageal mucosal ring</td>
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Clinical Presentation

• Symptoms - Typical
  – Dysphagia
  – Odynophagia
  – Inability to handle secretions
  – Retrosternal fullness
  – Regurgitation of undigested food
  – Pain
Clinical Presentation

• Perforation – Rare
  – Oropharyngeal
    • Neck swelling, tenderness, erythema, or crepitus
  – Esophagus
    • Severe retrosternal chest and/or upper abdominal pain, tachypnea, dyspnea, cyanosis, fever, and shock
  – Stomach/Small bowel
    • Peritonitis, such as abdominal pain, rebound, guarding, tachycardia, hypotension, and fever
Diagnosis

- Typical History
- Radiology
  - Chest X-ray
  - CT scan
- Endoscopy
Plain films

- Plain neck, chest, and abdominal radiographs may reveal a radiopaque foreign body or signs of esophageal perforation such as mediastinal, subdiaphragmatic, or subcutaneous air.
Plain films

- Radiographic localization and identification of foreign bodies in the esophagus is important prior to any attempt at extraction to localize the foreign body since this will affect the endoscopic approach.
Plain films

- Identification of airway landmarks on AP and lateral chest radiographs is important to differentiate between tracheobronchial and esophageal foreign bodies
- Fish bones, chicken bones, wood, plastic, glass, thin metal objects, and food impactions are not readily seen on plain films, so failure to locate an object on radiographic examination does not preclude its presence
- Avoid Barium ingestion as this will impede endoscopic treatment
Coin Lesion
Tracheal Foreign Body
CT scan

- Severe symptoms
  - Peritonitis
  - Mediastinitis
- If plain radiographs are negative, particularly in patients suspected of having ingested packets of narcotics
Management

- Type of object
- Location of the object
- Clinical status
- Conservative management is appropriate for the majority of patients since most objects will pass uneventfully
- Specific approach varies with the type of ingestion and the clinical setting
- Always practice with equipment prior to procedure
Timing of Endoscopy

• Patients can be triaged into one of three groups
  – Emergent endoscopy
  – Urgent endoscopy
  – Non-urgent endoscopy

• No FB should be allowed to remain in the esophagus beyond 24 hours from presentation
# Timing of endoscopy for ingested foreign bodies

<table>
<thead>
<tr>
<th><strong>Emergent endoscopy</strong></th>
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<tbody>
<tr>
<td>Patients with esophageal obstruction (i.e., unable to manage secretions)</td>
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<td>Disk batteries in the esophagus</td>
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<td>Sharp-pointed objects in the esophagus</td>
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<th><strong>Urgent endoscopy</strong></th>
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<tr>
<td>Esophageal foreign objects that are not sharp-pointed</td>
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<td>Esophageal food impaction in patients without complete obstruction</td>
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<tr>
<td>Sharp-pointed objects in the stomach or duodenum</td>
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<td>Objects &gt;6 cm in length at or above the proximal duodenum</td>
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<td>Magnets within endoscopic reach</td>
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<th><strong>Non-urgent endoscopy</strong></th>
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<td>Coins in the esophagus may be observed for 12-24 hours before endoscopic removal in an asymptomatic patient</td>
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<td>Objects in the stomach with diameter &gt;2.5 cm</td>
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<td>Disk batteries and cylindrical batteries that are in the stomach of patients without signs of GI injury may be observed for as long as 48 hours; batteries remaining in the stomach longer than 48 hours should be removed</td>
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</table>

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Timing of Endoscopy

- Emergent Endoscopy
  - Esophageal obstruction (evidenced by an inability to handle oral secretions)
  - Disk batteries in the esophagus
  - Sharp-pointed objects in the esophagus

Timing of Endoscopy

- Urgent Endoscopy – within 24h
  - Esophageal foreign objects that are not sharp-pointed
  - Esophageal food impaction without complete obstruction
  - Sharp-pointed objected in the stomach or duodenum
  - Objects >6 cm in length at or above the proximal duodenum
  - Magnets within endoscopic reach

Timing of Endoscopy

• Non-Urgent Endoscopy
  – Coins in the esophagus may be observed for 12 to 24 hours in asymptomatic patients
  – Blunt objects in the stomach that are >2.5 cm in diameter
  – Disk batteries and cylindrical batteries that are in the stomach in patients without signs of GI injury may be observed for up to 48 hours (however, disk batteries that are larger than 20 mm are unlikely to pass and should be removed)

Timing of Endoscopy

• Non-Urgent Endoscopy
  – Blunt objects that fail to pass the stomach in three to four weeks
  – Blunt objects distal to the duodenum that remain in the same location for more than a week (deep small bowel enteroscopy or surgery may be required depending on the location of the object)

Airway management

- Airway protection is important for all patients undergoing endoscopic foreign body removal
- Oropharyngeal suction is required
- Impactions in the esophagus require intubation to protect the airway
- Overtubes may be used to prevent an object from accidentally being dropped into the patient's airway
Foreign Body Tray

- Accessories
  - Overtube
  - Rat tooth forceps
  - Snare
  - Basket
  - Roth Net
  - Hood
Tools required
Management of impacted food

- Generally meat lodged above a peptic stricture or ring
- ASGE suggests emergent EGD with removal of food bolus
- Removal by pushing bolus of food into the stomach gently or removing in one piece via an overtube
- No role for glucagon or meat tenderizer
Management of impacted food

- If an esophageal stricture or ring is identified a dilation may be performed during the same session, provided there is no significant mucosal inflammation.
- Eosinophilic esophagitis (EoE) should also be considered prior to dilation (50% of patients presenting with food impaction have EoE).
- High incidence of complication with dilation of patients with EoE.
Management of impacted food

• Endoscopy can be deferred in patients in whom the food bolus impaction resolves spontaneously
• Endoscopy, esophageal biopsy, and in some cases esophageal motility should be performed at a later date because of the high likelihood of an underlying esophageal structural or motor abnormality
Management of impacted food

- **Papain**: NEVER, can digest esophagus and lead to hypernatremia, perforation and death
- **Glucagon**: 1mg IV, may help to lower LES, but not effective on rings/strictures, may cause nausea and vomiting. Low efficacy
- **Simultaneous dilation**: usually reasonable and safe.
- **Biopsies**: Safe and appropriate. If no diagnosis is made at index EGD then repeat EGD
Management of blunt objects

• Object may be advanced into the stomach where it is easier to grasp
• Endoscopy done using appropriate equipment
  – Basket/Net for most objects
  – Long overtube to protect GEJ
  – If no long overtube give 1 mg of glucagon to relax GEJ prior to FB removal
• If object has passed into stomach may observe for 4 weeks unless > 2.5 cm
Management of long objects

• Objects greater than 6 cm should be removed as they will not pass duodenal C sweep
  – i.e. – toothbrush/spoon/chopstick
• Grab with snare and remove via an overtube
  – If overtube not available use 1mg of glucagon
Case# 2

- 21 y/o F BU Senior with history of foreign body ingestion
- PMH – JRA
- Medications - MTX
Case# 2

- Patient was brushing her teeth coughed, sucking in her toothbrush
- It was halfway down her throat, and she bent over and accidentally swallowed it
- PE in EW
- NAD, T: 97.1 BP: 129/85 P: 89 R: 17 100%
- Labs Normal
Case# 2

• **CXR**
  - Small square-shaped radiodense opacities overlying the anterior abdomen on lateral view, which is only partially visualized

• **KUB**
  - Radiopaque foreign body overlying the position of gastric antrum
EGD 11/19/06

- **Stomach:**
  - *Contents:* Food was found in the stomach. A toothbrush was found in the stomach. Foreign body removal was attempted unsuccessfully using a forceps and snare due to large length of toothbrush and interference from food.
EGD 11/19/06
EGD 11/20/06
EGD 11/20/06
• **Stomach:**
  – A toothbrush was found spanning the pylorus. It was completely wedged into the duodenum.
  – Foreign body removal successful using a snare. The toothbrush was removed via an overtube in the esophagus
Management of sharp objects

• Sharp Objects in the esophagus represent a medical emergency
• Sharp objects in the stomach often pass
  – 35% complication rate, therefore all objects should be removed
Management of sharp objects

• Equipment for removal
  – Endoscope
  – Forceps, Snare or Roth net
  – Hood
  – Overtube

• Technique
  – Orientation of the sharp end to be trailing reduces mucosal injury
Management of batteries

- Button battery (hearing aids, watches, games, toys, and calculators) are the most common battery ingested
- Liquefaction necrosis/perforation can occur rapidly
- Batteries lodged in the esophagus should be emergently removed
- Overtube or endotracheal tube is essential to protect the airway
Management of batteries

- Batteries generally removed with net/basket
- Alternately push battery into the stomach and retrieve
- If a battery has passed beyond the stomach no need to remove unless intestinal injury
- Batteries >20 mm should be removed
- No role for acid suppressive medications
Did you know...

...the battery found in devices like this can get stuck in a child's throat, and in just two hours burn a hole in the esophagus?

1. Keep Out of Reach
2. Get help fast
3. Share this message

What you see

What a 3-year-old sees

BEWARE of Button Batteries

2,759 children swallowed a button battery in 2013

80% were younger than 6

2 hours in which severe damage can occur

Where do children find the most dangerous type (20 mm) of button batteries?

- 36%
- 13%
- 9%
- 8%
- 4%
- 3%
“We live in a world designed by adults for the convenience of adults, and the safety of children is often not considered.”

–Gary Smith
Director, Center for Injury Research & Policy, Nationwide Children’s Hospital
Case# 3

- 23F admitted for FB ingestion
- PMH
  - Acute bowel Obstruction in 2008 s/p bowel resection - in Peterborough New Hampshire
  - Fundoplication at 5 months for GERD
  - Obsessive compulsive disorder
  - Pervasive developmental disorder
  - ADHD
  - Anxiety disorder
Case# 3

- Between 5 to 6:00 PM swallowed 2 AA batteries from her TV remote control
- Transferred from Cape Cod Hospital for evaluation to BIDMC
- PE
  - NAD, VS Tm 98.5  T 98.5  P 90 BP 105/65 RR 22 O2Sat on 94% on RA
  - Labs - Normal
Case# 3

- KUB
  - Two double A batteries are seen in the distal esophagus
Case# 3

• **Esophagus**
  – One AA battery was seen in the mid/distal esophagus. There was no evidence of caustic or other mucosal injury

• **Stomach**
  – Another AA battery was seen in the stomach. Again there was no evidence of caustic or other mucosal injury.

• **Duodenum:** Normal duodenum.
Case# 3

- After visualizing both batteries, the scope was withdrawn and the overtube was placed. Using a snare, both batteries were removed one at a time through the overtube.
Case #4

- 38 yo male with schizophrenia
- History of ingesting FB after auditory hallucinations
- Presented to OSH with ingestion of a spoon
- EGD at OSH unable to retrieve object
- Pain led to transfer to BIDMC
Case #4

- EGD demonstrated 2 plastic spoons in antrum and one metal spoon in the antrum
Case #4
Management of magnets

- Magnets are rarely ingested
- Magnet can stick together (or to other ingested metal) can trap mucosa and cause necrosis, perforation and fistula formation
- Dangerous as they can cause severe injury
- All magnets need to be removed
  - Can be removed with a net or snare
  - Surgery needs to be done if endoscopy cannot be performed
Management of magnets

• Newer Neodymium magnets are 5x stronger
  – Sold in 100’s as desk toys (“bucky balls”)
  – Used by teens as simulated piercings
• Banned in 2012 but still easily available online
MAGNETS GO IN EASIER THAN THEY COME OUT
KEEP SMALL MAGNETS OUT OF REACH OF CHILDREN
Management of coins

- Coin ingestion is most common in young children – except for college students playing quarters
- Coins generally pass spontaneously
- Symptomatic coin ingestion need to be retrieved
- Overtube, snare and Roth net
Body Packing

• Internal concealment of illegal drugs wrapped in plastic or contained in balloons or latex condoms is seen in regions of high drug trafficking
• Diagnosis is made by plain X-rays or CT scan
• Endoscopic drainage is contraindicated as leakage can be fatal
• Inpatient observation, bowel preparation and radiographic follow-up
• Surgical removal only suspected leakage or bowel obstruction
Foreign Body

*Foreign body discovered in ileum.*

*Foreign body in Roth net.*
Take Home

- Avoid contrast radiographic examination before removal of foreign objects
- ENT consultation for foreign bodies at or above the level of the cricopharyngeus
- Emergent removal of esophageal food bolus impactions and foreign bodies in patients with evidence of complete esophageal obstruction
Take Home

• Acceptable methods for the management of esophageal food impactions include en bloc removal, piecemeal removal, and the gentle push technique
• Remove all objects with a diameter larger than 2.5 cm from the stomach
• Remove sharp-pointed objects or objects longer 6 cm in the proximal duodenum or above
Take Home

• Emergent removal disk batteries in the esophagus
• Urgent removal of all magnets within endoscopic reach
• Coins within the esophagus may be observed in asymptomatic patients but should be removed within 24 hours of ingestion if spontaneous passage does not occur
• Recommend against endoscopic removal of drug-containing packets
Take Home

• When is Endoscopy urgent/emergent?
  – When the ingested object is long (>5cm), wide (>2cm) or sharp, and is in the esophagus/stomach
  – When the ingested object is a high powered magnet
  – When a disk battery is in the esophagus
  – What the patient shows signs of airway compromise
  – When there is esophageal obstruction
  – When there are signs or symptoms suggesting inflammation or intestinal obstruction