Foreign Bodies and Caustic Ingestions:
What comes out and when?

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Learning Objectives:

1) Be able to identify signs or symptoms that may indicate foreign body ingestion
2) Be able to identify which foreign bodies need urgent referral for endoscopic removal
3) Learn risks associated with specific ingestions

Upon completion of this lecture, physicians should be able to identify foreign bodies needing urgent endoscopic removal or ER evaluation.
Most Important

1) Be Suspicious!

2) If unsure what to do or think a foreign body may need urgent removal, please contact GI early for advice and prepare accordingly.
Foreign Body Ingestions – In General

- Up to 98% are accidental

- Coins are most common followed by toys, jewelry and foods

- Many are never detected and up to 16-20% of known ingestions are unwitnessed

- Up to 90% of foreign bodies will spontaneously in up to 7 days

- 80% occur in children (most developmentally normal) and 10% are repeat offenders

- Most recurrent cases are non-accidental, occur in patients with psychiatric disease

- Patients with psychiatric disease and developmental delay are at higher risk of sharp object ingestion
Foreign Body Ingestion – In General

• ~10-20% of FBs will need endoscopic removal and ~1% may need surgical removal

• It is most important to identify those that pose a risk of complications or retention

• Risk of perforation is low, but is increased with button batteries and magnets or sharp objects (~30%)

• Sharp & long objects account for up to 35% of perforations from FBs
Foreign Bodies - Complications

• Symptoms range from mild to severe
  • Mild: asymptomatic (60-80%), chest discomfort, odynophagia, dysphagia, abdominal pain
  
  • Severe: vomiting, retching, stridor/wheezing (tracheal compression), feed refusal, drooling, hematemesis
  
  • Wheezing & fever should raise concern for respiratory tract location
  
• Be alert that you may encounter ingestions that are not recent to the acute presentation
Foreign Bodies - Impaction

- Most common impaction sites: UES (60-70% of esophageal FBs), aortic arch, LES, pylorus, Ileocecal valve
  - May also present at sites of pathologic narrowing, dysmotility, or prior surgery
  - Long objects may also get stuck in duodenum, at the ligament of Treitz or the rectum

- Perforations most commonly occur near duodenal loop or ileocecal valve due to fixed/nonflexible retroperitoneal location
Assessment

- History (what/when/how much), Symptoms, exam

- Assess for location & suspected complications with radiology

- Any symptomatic foreign body that is radiolucent (glass, wood, plastics) requires endoscopic assessment

- If FB is radiolucent AND asymptomatic, consult radiology on whether a contrast study may be useful

- When the size or shape of the ingested item is unclear, it is often helpful if parent brings along an extra if they have one

- If symptoms resolve, consider reassessing object location as it may have progressed
Objects Likely to Pass are:

- Blunt
- Noncaustic
- <2-2.5cm in diameter
- <5cm in greatest dimension or <3cm in young children
- Beyond the esophagus
- Or in a Child >4 years old
Urgent Removal is Required for:

- **Symptomatic!**
- Sharp
- Long >5cm
- Wide >2.5cm in diameter
- Multiple or unknown # of magnets
- Button battery in esophagus
- Airway compromise or esophageal obstruction
- Failure to pass esophagus in 24hrs or unknown time of ingestion
- Superabsorbent materials
GROW SNOW

Snow Expands 100X Original Size!

WARNING:
This set contains chemicals that may be harmful if misused. Read cautions or include containers carefully. Not for children under 3 years.

JUST ADD WATER
Watch It CRUST!

Water Balz

Grows to the Size of a Racquetball

WARNING:
CHOKING HAZARD - Small parts. Not for children under 3 years.
Esophageal Foreign Bodies

• Most retained foreign bodies are acute, however chronic retention is possible
  • Symptoms & complications include: Decreased PO/feed refusal, aspiration, weight loss, vomiting, and fistula/stricture development

• Sharp objects: these are an emergency & require surgical backup
  • If sharp end leads, high risk of perforation
  • Signs of perforation: neck swelling, crepitus, pneumomediastinum (on imaging), respiratory distress
Esophageal Foreign Bodies - Exam

• Physical Exam should include the neck, chest & oropharynx to help assess for complications and emergent conditions
  • Particularly signs of perforation & obstruction

• AP & Lateral films of neck/chest/abdomen to localize & define object if possible

• Radiography may miss radiolucent foreign bodies. Minimal amounts of contrast may be used if radiolucent object is suspected.

• Too much contrast is a risk for aspiration, poor visualization on EGD

• CT-reconstruction is also an option sometimes
• Asymptomatic, low-risk objects may be observed for 12-24hrs for spontaneous passage

• A medication which MAY help is glucagon. It has low efficacy, but also low side effects.
  • Should not started if it would delay transfer
Specific Foreign Bodies
Coins
Typically orient coronally in esophagus & appear circular on AP films. In trachea will usually appear sagittal & best seen on lateral film.
Beware of non-standard coins: old/rare/foreign

SIZE COMPARISON BETWEEN AMERICAN COINS

NOTE: ACTUAL SIZE MAY DIFFER DEPENDING ON THE SIZE OF YOUR MONITOR

DIME: 17.9 mm
PENNY: 19 mm
NICKEL: 21.2 mm
QUARTER: 24.3 mm
DOLLAR COIN: 26.5 mm
Coin ingestions

• Single coins can remain in the stomach for 4 weeks without need for acute intervention after which nonurgent removal is recommended as it is unlikely to pass thereafter

• X-ray Q1-2 weeks until it passes
  • Parents may strain stool to confirm passage, avoid extra X-ray

• Symptoms of gastric outlet obstruction, pain, or peritonitis require more urgent removal

• Rarely, retained gastric coins can epithelialize, but are usually still safe for endoscopic removal
Multiple coin ingestions are an exception
Magnets
Magnets

• Had been successfully removed from commercial market in 2000s but are now back on the market

• If a single magnet ingested, follow initial rules and monitor w/ serial KUB, but ensure no magnetic metal on clothing

• If multiple magnets (or magnet + other metal object) ingested, immediate retrieval is indicated due to risk of Small bowel entrapment/perforation

• If magnets are beyond endoscopic reach, patients should be admitted until either they have all passed or surgery is needed
BIG magnetic ball
216 pcs 5MM
Small Bowel Perforation Due to Neodymium Rare Earth Magnets
Food Bolus/Bezoars
Esophageal Food Boluses

- Meats are the most common esophageal food impaction
  - Historically meat tenderizer has been considered to dissolve this, but is contraindicated
  - Breads also common

- Should raise suspicion for Eosinophilic esophagitis
  - Other causes: prior caustic ingestion, surgery, slings/webs/strictures

- More common with h/o TEF with repair

- May remain in esophagus 12-24hrs prior to removal if asymptomatic
Bezoars

• Tightly packed collection of partially digested or undigested materials
  • May consist of non-food items

• Food Bezoars may occur in patients with dysmotility/gastroparesis

• Often poorly visualized on imaging studies and only give signs of gastric outlet obstruction
  • Often seen incidentally on contrast studies as a filling defect
  • Cri-du-chat*

• Bezoars may be large and may possibly need surgical removal due to size and inability to remove endoscopically
Types of Bezoar

• Trichobezoar: hair accumulation. May also cause intestinal obstruction due to Rapunzel syndrome
  • More common in developmentally delayed or those with psychiatric disease
  • May cause intussusception

• Body Packing: Ingested drug packets used for trafficking, require whole bowel irrigation and surgical team on standby in case of symptoms/signs of packet rupture
  • No role for endoscopic intervention

• Phytobezoars: made of plant/fruit matter. Most common across all age groups, most associated with persimmons
Types of Bezoar

• Lactobezoar: milk bezoar, may occur in infants with abdominal pain, increased emesis/gastric residuals, poor feeding/intolerance

  • Most often noted incidentally on contrast studies. Dissolves with gastric lavage
Lactobezoars may also be seen on ultrasound at times, but are more technician dependent.
Button Battery Ingestions
Button Battery Ingestions

• Highest risk in the esophagus

• Differentiated from coins by double halo sign on x-ray
  • Also Step-off sign

• Causes corrosive damage from battery acid, pressure necrosis, AND electrical damage (hydrolysis) from closed loop circuit

• Tissue injury can occur in <2hrs
**BUTTON BATTERY INJURIES IN CHILDREN**

More than 2,500 children (under age 18) ingest button batteries every year in the U.S.

Button batteries are found in many household electronic devices such as remote controls, flameless candles, bathroom scales, and numerous other household devices.

Button batteries can cause severe tissue burns in as little as 2 hours and can cause lifelong injuries.

If you suspect that your child has swallowed a button battery or placed one in the nose or ear then **immediately** get them to the nearest emergency room.

Call the National Battery Ingestion Hotline with any questions, **800-498-8666**.
Button Battery Ingestions

• Can lead to Tracheoesophageal fistula, arterial or aortic perforation, esophageal or mediastinal perforation, vocal cord paralysis (laryngeal nerve damage), and pneumothorax
  • May lead to fatalities if not removed promptly

• Risk highest if <4yo, >2cm, or lithium batteries (higher charge)

• After esophageal button battery removal, children should be observed for 24hrs in hospital as necrosis and perforation may have delayed manifestations
Button Battery Ingestions

• Once in the stomach, button batteries may be at higher risk of stomach irritation, but risk of perforation is significantly decreased

• Batteries that persist in the stomach after 72hrs should be removed

• Batteries in the small intestine/colon are low risk and should pass without intervention
Pill Esophagitis
Pill Esophagitis

- Pills that lodge in the esophagus can cause pressure ulceration or injury with medication disintegration. Some may even be caustic
  - May result in ulceration & scarring

- Risk for pill esophagitis increases with: large pill size, decreased salivation/insufficient fluid intake, supine position during ingestion, abnormal anatomy or dysmotility
  - May be more common in EoE

- Perforations are uncommon

- Medications Included: acidic damage (Tetracyclines (doxy) or ferrous sulfate) or alkaline (phenytoin)
  - Also noted with alendronate, KCl, NSAIDs, quinines
Pill Esophagitis

• Symptoms: chest pain, dysphagia, odynophagia, emesis

• Treatment: increase fluids/change med if possible
  • Short course PPI & Carafate for healing
  • Prophylactic counseling

• If symptoms are persistent/severe, Endoscopy usually confirms discrete ulceration c/w history
  • Usually no need to retrieve the pill or push it through, but can be performed if needed

• Children with anxiety may be at risk of globus hystericus
## Small Intestine

<table>
<thead>
<tr>
<th>Item</th>
<th>Small intestine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General rules</strong></td>
<td>Surgical removal if objects fail to progress for more than 1 week. Emergent surgical removal if symptomatic.</td>
</tr>
<tr>
<td><strong>Button batteries</strong></td>
<td>Surgical removal if x-rays show failure to progress</td>
</tr>
<tr>
<td><strong>Large diameter (&gt;15 mm) batteries</strong></td>
<td>See general rules</td>
</tr>
<tr>
<td><strong>Coins</strong></td>
<td>See general rules</td>
</tr>
<tr>
<td><strong>Sharp-pointed objects</strong></td>
<td>If within reach, then immediate endoscopic removal with sharp end trailing. Straight pins can be left.</td>
</tr>
<tr>
<td><strong>Large objects (longer than 5 cm or wider than 2 cm)</strong></td>
<td>See general rules</td>
</tr>
<tr>
<td><strong>Food impactions</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong>Narcotic packets</strong></td>
<td>No endoscopic removal. Surgical intervention if failure to progress, symptomatic, signs of obstruction, or suspected rupture</td>
</tr>
<tr>
<td><strong>Multiple magnets</strong></td>
<td>If within reach, then immediate endoscopic removal. Otherwise, see general rules</td>
</tr>
</tbody>
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Rectal Foreign Bodies

• More associated with adults than children

• Almost always intentional d/t: sexual acts, drug trafficking, attention-seeking behavior

• Retained foreign bodies may be a risk for rectal perforation & require removal, possibly under anesthesia
Caustic Ingestions
Caustic Ingestions

• Most common from 1-3yrs, but can occur in teens as a method of self-harm

• Incidence reduced by laws requiring caustic products to have protective opening mechanisms and <10% active ingredient. These laws are usually not found in 3rd world countries where ingestions remain high

• Many ingestions may still occur because of opened containers or transfer to secondary containers

• Symptoms range from drooling, respiratory symptoms, PO refusal, dysphagia/odynophagia, abdominal pain, vomiting, hematemesis

• Oropharyngeal exam correlates poorly with damage to other parts of the GI tract
Caustic Ingestions

• Alkaline ingestions are more common (taste less harsh, more pervasive in cleaning supplies)
  • Cause liquefactive necrosis of esophagus & stomach
  • Tide pods*
• Acidic ingestions cause coagulative necrosis and eschar formation
  • May cause pylorospasm and antral pooling
• Other chemical agents: Iron, pine oil cleaner, NSAIDs, and oxidizing agents (bleach, H2O2)
  • Bleach causes ulcerations, but stricturing is unusual
Caustic Ingestions

• Stomach injury is more common than esophageal injury due to short dwell time & esophageal resistance to acids/coagulative necrosis

• Stomach is at risk from both strong acids and strong alkaline substances

• Severity of damage depends on time and pH of exposure
  • inflammation, fibrosis, ulceration, hemorrhage, necrosis & perforation

• Strong caustic substances also raise risk of antropyloric stricturing (4-6 weeks)
  • Delayed symptoms
Caustic Ingestions – Initial Management

1) Assess & Stabilize the patient, examine for respiratory involvement
   - Obtain CXR/KUB

2) Identify the ingested substance (if witnessed), possible volume ingested, time since ingestion, and symptoms

3) Contact poison control. Many mild ingestions require only observation

4) If symptomatic, NPO, IVF, IV PPI, and contact GI (if indicated)
   • NO induced emesis or gastric lavage!
   • Severe/symptomatic caustic ingestions without concern for perforation should undergo EGD within 24-72hrs to assess extent of damage and prognosis
Takeaways
Objects Likely to Pass are:

- Blunt
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References


Thank You for Attending!
Questions?