

Foreign Body Ingestions In Children



Tracey Wagner, MD

09/28/2021

Pediatric Emergencies: Early
Assessment & Treatment of Children



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™



THE OHIO STATE UNIVERSITY
COLLEGE OF MEDICINE



Objectives

By the end of this presentation you should:

- Be able to distinguish between button batteries and coins on xray
- Describe the mechanism of injury for magnet and button battery ingestions
- Follow the algorithm for button battery ingestion provided by the National Capital Poison Center
- Identify indications and contraindications for honey in button battery ingestion

Background

Foreign Body Ingestions Are Common

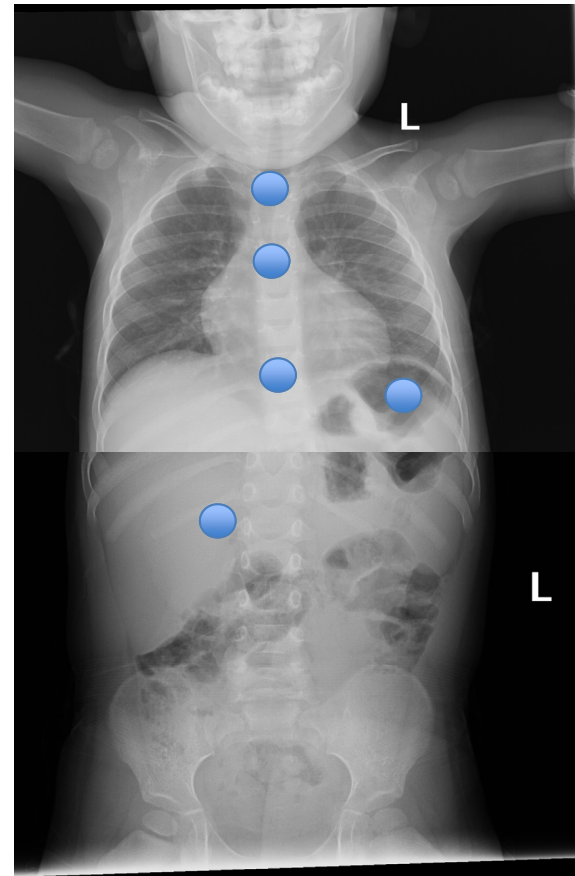
- Over 100,000 ED visits annually
- Majority in children 6mo to 3 yo
- Increased frequency in those with behavioral issues or developmental delay

Common Culprits:

- Coins, small toys, jewelry, button batteries, magnets, safety pins

Pertinent Sites of the GI Tract

- Esophagus
 - Thoracic inlet(70%)
 - Level of the aortic arch
 - Gastroesophageal junction
- Stomach
- Post pyloric



Patient Presentations

“I saw my child swallow...” or “My child told me they swallowed...”

- Accounts for most presentations
- Children may be asymptomatic

Vomiting, Choking, Drooling, Gagging, Pain, FB sensation, Food Refusal, Abdominal Pain, Wheezing

- Symptoms depend on location of fb

Diagnostics

Metal Detector Wand

- Limited to coins

Plain films

- Mouth to anus
- Consider including ear, nose as well
- 2 views

Esophagram

CT chest

Endocscopy

Case 1

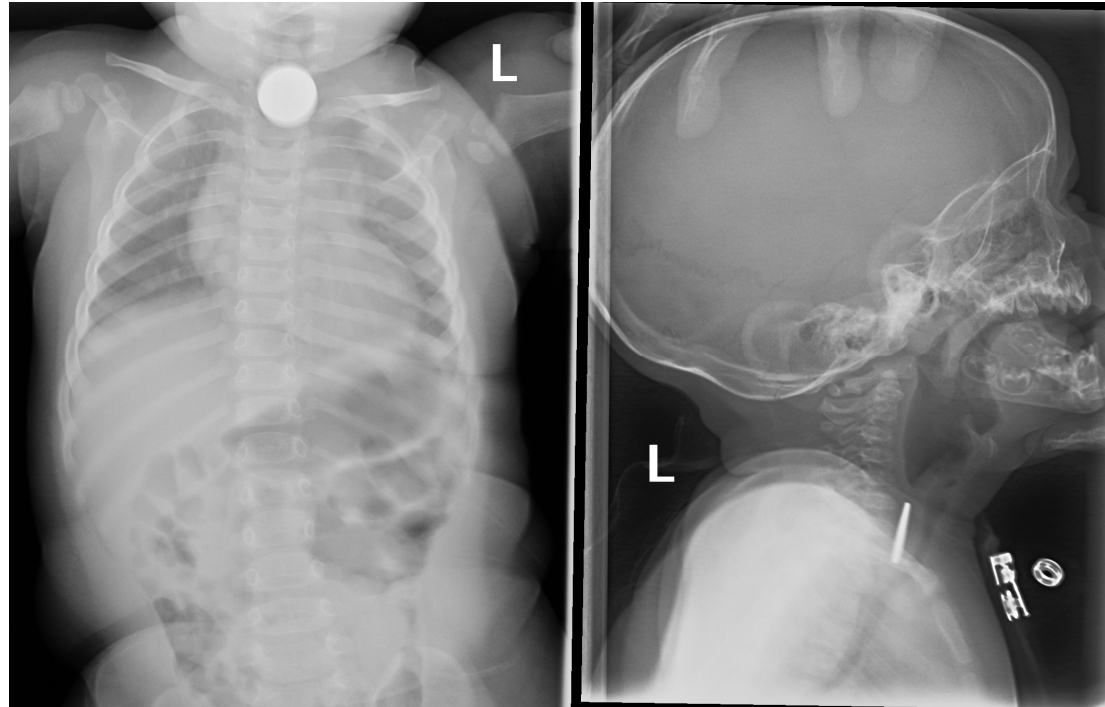
11 mo F presents with concern for fb. She had a choking episode and has vomited since. 2 yo sibling has a recent fascination with coins and has been playing with them.

Exam:

Drooling and crying infant.

No respiratory distress

Diagnostics



Management

No Indication For Glucagon

Possible Removal Techniques:

- Endoscopy
- Spontaneous passage
- Foley catheter removal
- Bougienage

Timing:

- Unknown timing of ingestion or delayed presentation
- Acute ingestion
 - Symptomatic
 - Asymptomatic

Bougienage 2015 Study

Criteria for bougienage

Single coin

Present within 24 h of ingestion

No esophageal abnormalities or surgeries

Coin located below the clavicles and above the diaphragm

No respiratory distress

No prior foreign body ingestions

	Pediatric Surgery		ENT
	Bougienage	Endoscopy	Endoscopy
Number of patients	123	177	218
Mean age, y	4.37	2.52	3.24
Eligible for bougienage	112 (91%)	13 (7%)	58 (26.6%)
Success rate	94%	100%	100%
Median hospital charge, range	\$579.75 (\$139–\$9,230)	\$5,379 (\$308–\$11,554)	\$4,593 (\$241–\$36,124)

Case 1

Emergent Endoscopy with Removal

Summary Of Coin FB

- Most Common
- XR
- Esophageal Impaction Likely Requires Intervention
- Stomach and Beyond
 - Monitor stool
 - Outpatient follow up xrays every 1 to 2 weeks

A Tale of Two Cases

15 yo male presents with fb sensation after swallowing a Gatorade ring.

Exam unremarkable

FB xr series- Negative

ENT consult

17 yo male presents with fb sensation after swallowing a bottle cap.

Exam unremarkable

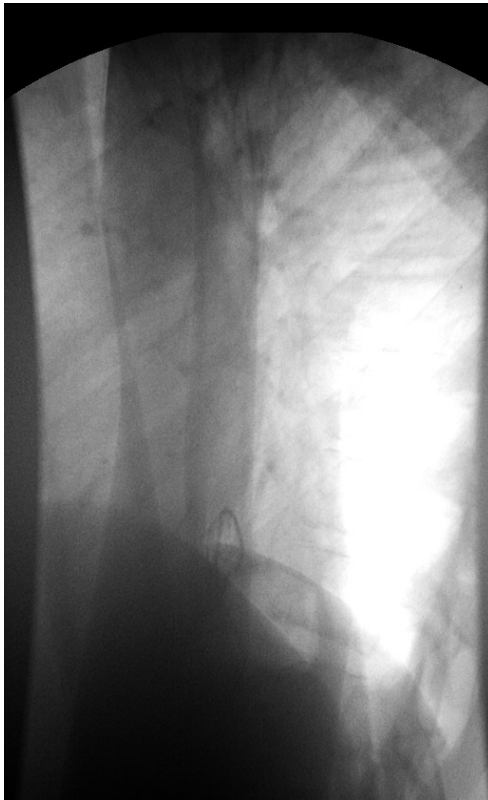
FB xr series- Negative

ENT consult

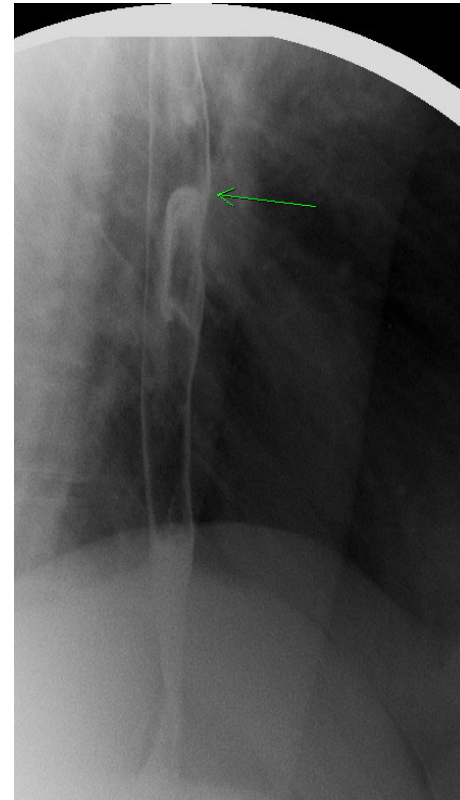
- Negative bedside scope

Esophagram

15 yo case



17 yo case



Endoscopy

15 yo with no fb identified and no esophageal injury identified

17 yo with successful removal of bottle cap

Case 4

9 yo male hx of ADHD presents with abdominal pain.
Started acutely 5 hours prior to arrival. Transferred from OSH with concern for acute appendicitis.

- +constant periumbilical pain
- +vomiting, nbnb
- +constipation
- fever

Exam

Normal vital signs

Well appearing

Bilateral lower quadrant ttp, no guarding, no rebound

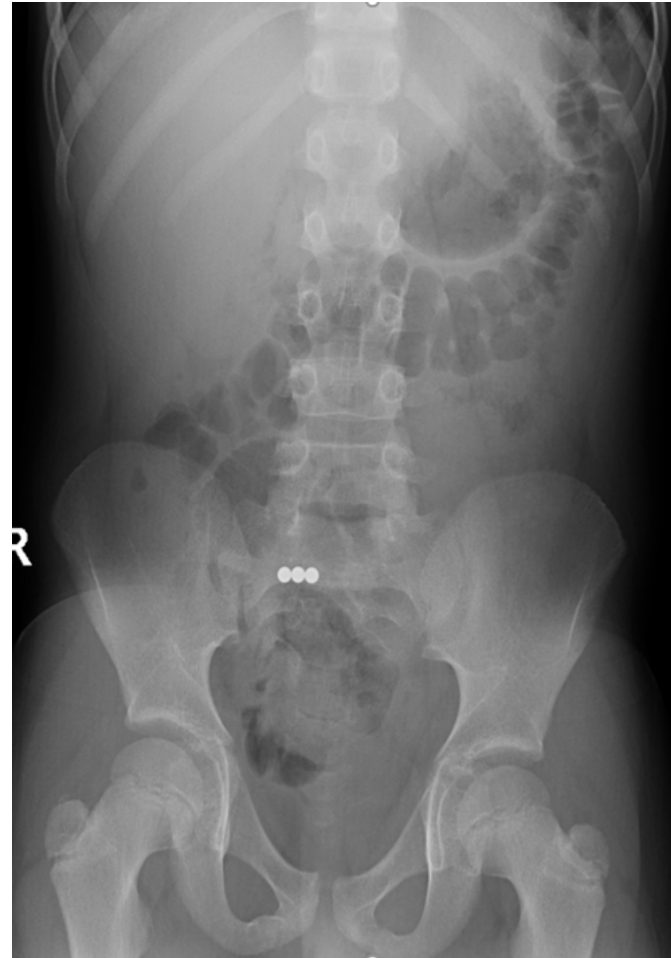
GU exam normal

Diagnostics

RLQ US negative

KUB to eval stool burden

- Episode of bilious emesis



Magnets

Small, powerful magnets composed of neodymium

- First case report 2002. First reported death in 2006
- 5-30 times stronger than conventional magnet
- Buckyballs and now numerous other brands
- Briefly taken off market but now back

Young children as well as older adolescents/teens

Magnets

Mechanism of injury:

- 2 or more magnets attract through layers of bowel wall leading to pressure necrosis, perforation, fistula formation, obstruction
- A single magnet could be attracted to a magnetic object

Management of Magnet Ingestion

Single Magnet

- Observation and caution with serial xrays
- Consider removal if in stomach or esophagus

Multiple Magnets

- Expert consultation
- Endoscopic removal
- Serial exams and films with or without bowel cleanout
- Surgical removal

Case 4: Hospital Course

- Observation admission to pediatric surgery
- Miralax cleanout and repeat imaging
- HD3
 - No advancement of magnets
 - Decision for OR

Exploratory laparotomy: 3 magnets found. Two in colon, one in small bowel. Adhesed together and in process of fistulizing

Required colotomy and enterotomy

Case 4 Highlights

Have a high index of suspicion

Imaging can be deceiving

Serious risk of morbidity

Case 5

17 mo presented with respiratory distress and stridor.
1 wk prior with fever, vomiting and started on Tamiflu.
Noisy breathing started yesterday and worsened.
EMS treated with albuterol

On arrival:

severe respiratory distress, stridor
listless

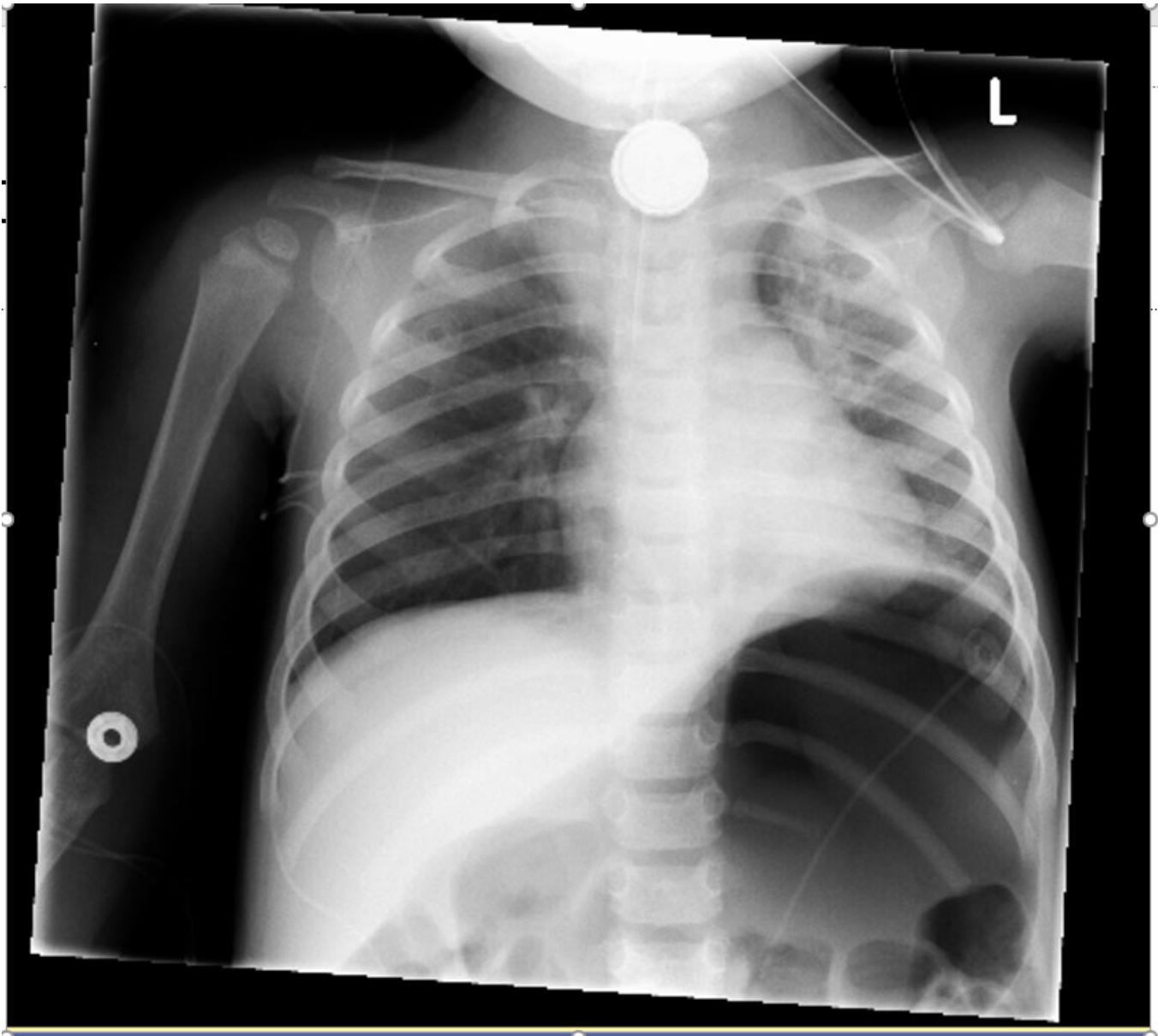
Case 5: ED course

Racemic epinephrine x2 without improvement.

Heliox → desaturation to 80%

Emergent intubation

- First attempt: purulent secretions, visualized through cords but no color change on colorimetric capnography
- Second attempt: same but also with significant abdominal distension developing
- Third attempt: successful

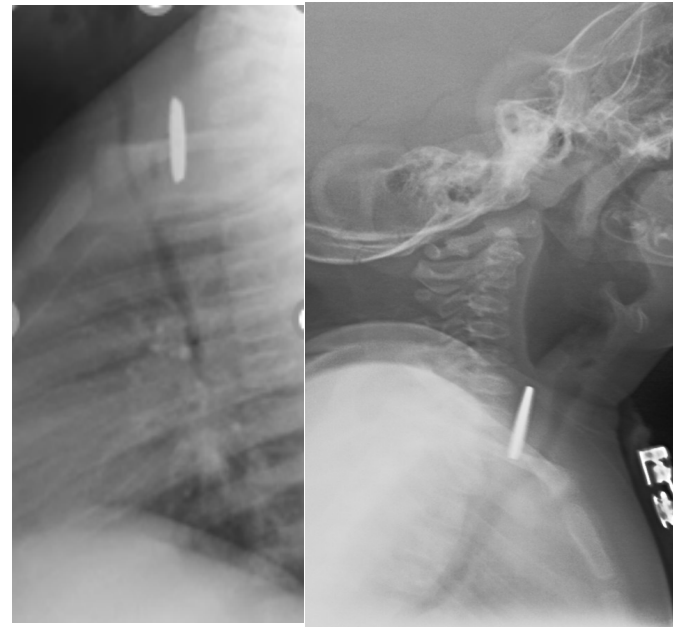
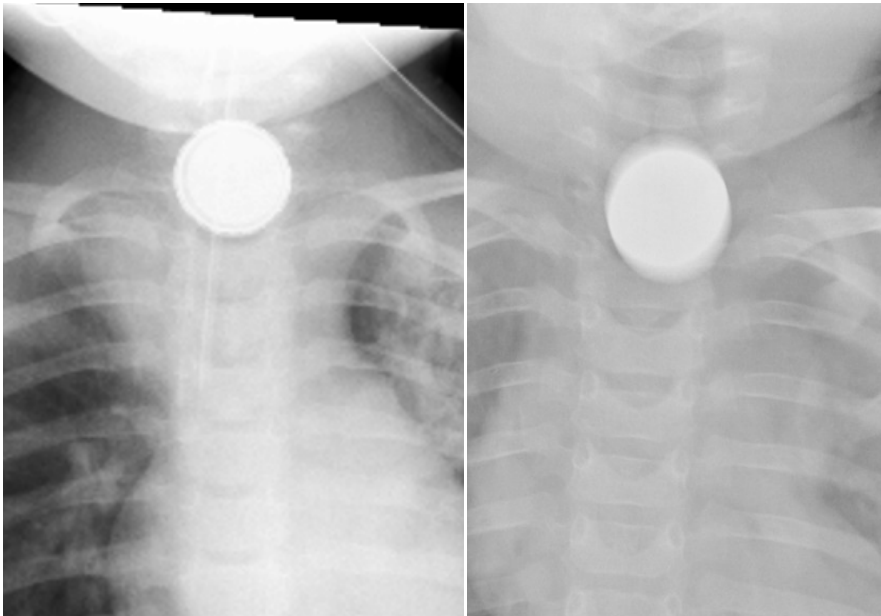


NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™



THE OHIO STATE UNIVERSITY
COLLEGE OF MEDICINE

Coin vs Button Battery



Button Battery Ingestion

Caustic injury

- Flow of electrical current to tissue near the negative pole
- Even “dead” batteries can have charge
- Injury occurs rapidly
 - as soon as within 2 hours and is more severe after 8 to 12 hours

Pressure Injury

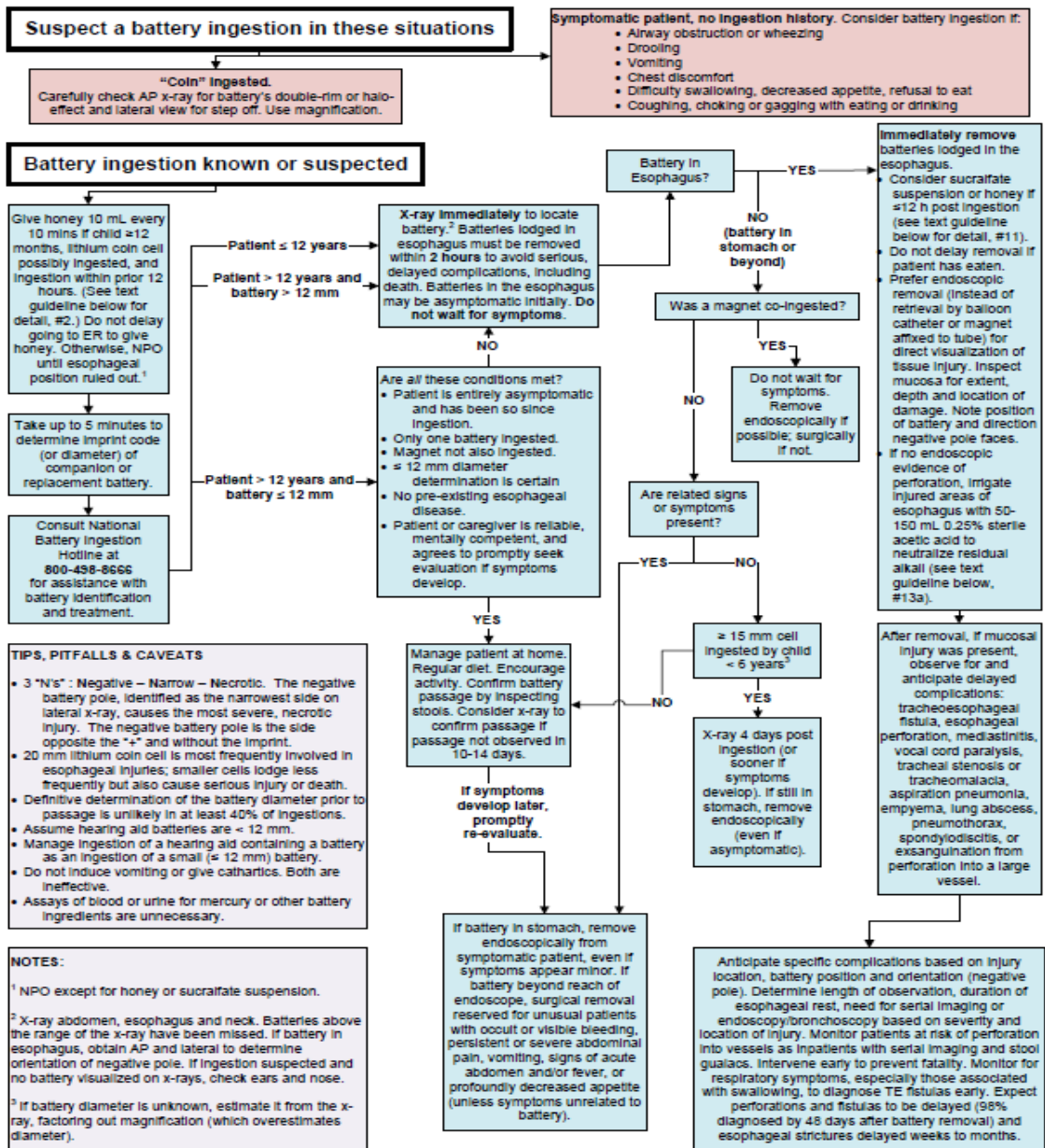
Button Battery Ingestion

For additional information contact the
National Battery Ingestion Hotline 24/7 at:

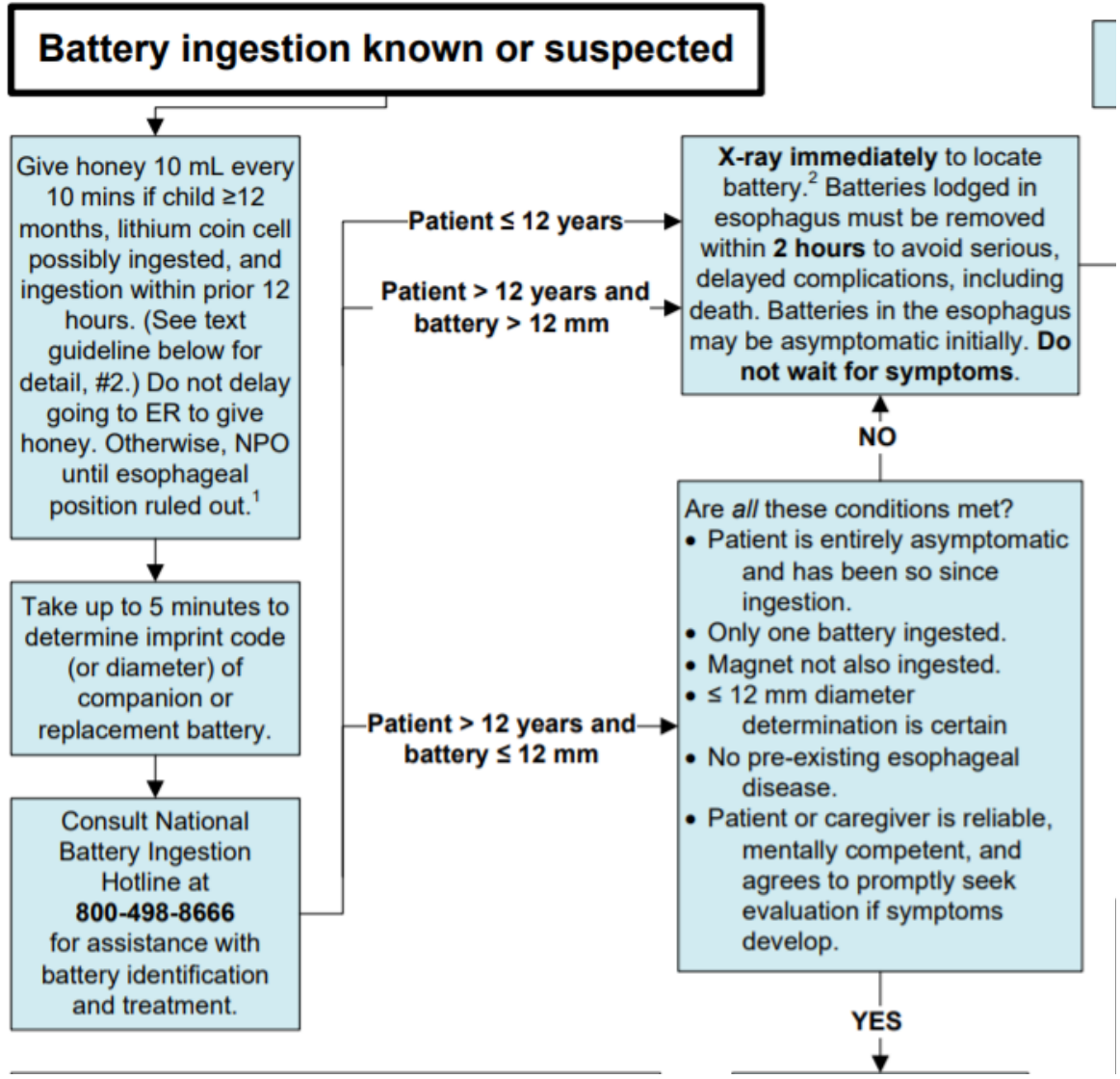
800-498-8666

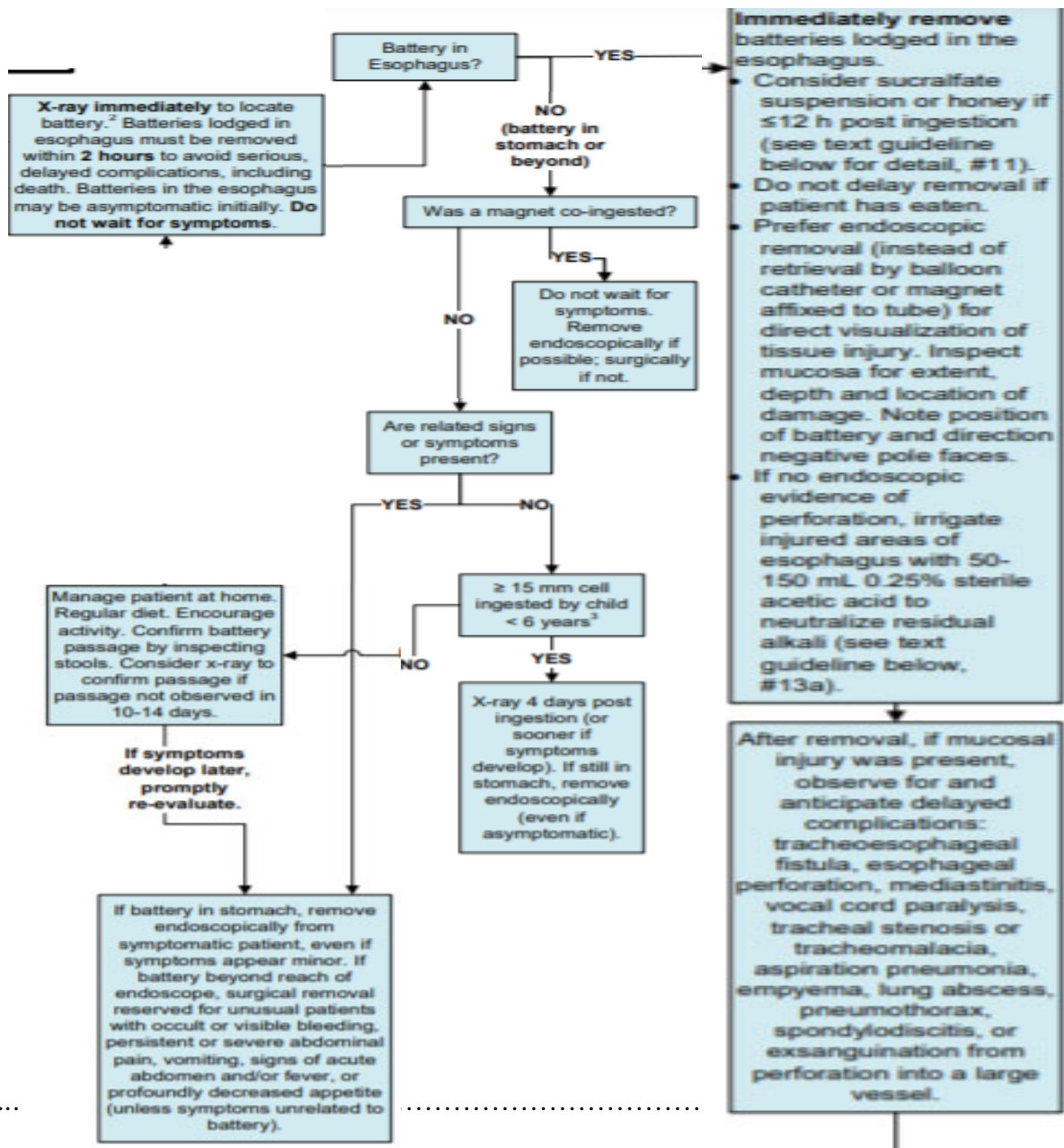
The National Battery Ingestion Hotline is for both health professionals and the public.
It is staffed by toxicologists and poison information specialists, 24/7.





National Capital Poison Center Algorithm





Honey or Sucralfate

Can delay alkaline burns to tissue by preventing the generation of hydroxide

- Efficacy based on 2018 study on cadaveric porcine esophagus and live piglets
- Both prevented expected battery-induced pH increase and decreased the depth of the esophageal injury

Honey and Sucralfate

Indications

- Suspected button battery ingestion
- Ingestion within past 12 hours
- Child able to swallow
- For honey- age greater than 12 months
- Immediately available

Dosing of Honey

- 10ml every 10 minutes for up to 6 doses

Dosing of Sucralfate (1g/10ml)

- 10ml PO every 10 minutes up to 3 doses

Case 5

- ENT straight to OR
 - Button battery removed
 - Tracheoesophageal fistula and second esophageal perforation
 - Multiple returns to OR emergently and nonemergently
 - Eventual tracheostomy placement

Case 6

4 yo presents after accidentally ingesting portion of a broken plastic spoon. Throat and chest pain which was improving. Estimated 1cm wide and 3cm long sharp edged piece of plastic.

Normal exam

FB xr series negative.

Sharp-Pointed Objects

High risk of perforation if lodged in the esophagus (15-35%)

Radiopaque objects

- Xr to localize
- Removal via endoscopy if in esophagus and possibly if in stomach
- Serial radiographs if asymptomatic and in small or large bowel

Radiolucent objects

- Endoscopy for symptomatic patients
- Further imaging and observation if asymptomatic

Long Objects

Objects longer than 4-6 cm often become lodged in the stomach

Require endoscopic removal

Case 6

ENT consult

- Esophagram negative
- Admission
- Rigid Esophagoscopy and Bronchoscopy negative
- Case discussed with GI and plan for outpatient observation

Questions?



References

- Abbas, Mazen I., et al. "Magnet Ingestions in Children Presenting to US Emergency Departments, 2002–2011." *Journal of Pediatric Gastroenterology & Nutrition*, vol. 57, no. 1, 2013, pp. 18–22., <https://doi.org/10.1097/mpg.0b013e3182952ee5>.
- Dipasquale, Valeria, et al. "Managing Pediatric Foreign Body Ingestions." *Pediatric Emergency Care*, Publish Ahead of Print, 2020, <https://doi.org/10.1097/pec.0000000000002245>.
- Heinzerling, Nathan P., et al. "Safe and Effective Management of Esophageal Coins in Children with Bougienage." *Surgery*, vol. 158, no. 4, 2015, pp. 1065–1072., <https://doi.org/10.1016/j.surg.2015.06.025>.
- Hodges, Nichole L., et al. "Rare-Earth Magnet Ingestion–Related Injuries in the Pediatric Population: A Review." *American Journal of Lifestyle Medicine*, vol. 11, no. 3, 2015, pp. 259–263., <https://doi.org/10.1177/1559827615594336>.
- Jyamaha, Dharshinie, and Gregory P Connors. "Managing Pediatric Foreign Body Ingestions." *Missouri Medicine*.
- Kay, Marsha, and Robert Wyllie. "Foreign Body Ingestions in the Pediatric Population and Techniques of Endoscopic Removal." *Techniques in Gastrointestinal Endoscopy*, vol. 15, no. 1, 2013, pp. 9–17., <https://doi.org/10.1016/j.tgie.2012.09.005>.
- Kramer, Robert E., et al. "Management of Ingested Foreign Bodies in Children." *Journal of Pediatric Gastroenterology & Nutrition*, vol. 60, no. 4, 2015, pp. 562–574., <https://doi.org/10.1097/mpg.0000000000000729>.
- Litovitz, T., et al. "Emerging Battery-Ingestion Hazard: Clinical Implications." *PEDIATRICS*, vol. 125, no. 6, 2010, pp. 1168–1177., <https://doi.org/10.1542/peds.2009-3037>.
- Louie, M. C., and S. Bradin. "Foreign Body Ingestion and Aspiration." *Pediatrics in Review*, vol. 30, no. 8, 2009, pp. 295–301., <https://doi.org/10.1542/pir.30-8-295>.
- Waltzman, Mark L. "Management of Esophageal Coins." *Current Opinion in Pediatrics*, vol. 18, no. 5, 2006, pp. 571–574., <https://doi.org/10.1097/01.mop.0000245361.91077.b5>.