Button Battery Ingestion Pathway: ED and IP Management

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If Active and/or Sentinel Bleed, Esophageal Perforation, Patient Clinically Unstable:
- MTP Activation
- Emergent General Surgical Consult
- Include Cardiothoracic/ Vascular Surgery
- Transfer to AMBH PICU

Patient presents with known or suspected Button Battery (BB) ingestion[1,2]

For ingestion <12 hours[2]:
- ≥12 mo. give honey 10 ml PO Q10 min
- <12 mo. give Carafate 1g PO Q10 min

Keep patient NPO (except honey/ Carafate) Provide oral suction as needed.

Obtain Foreign Body Series per radiology protocol[3]

For all known or suspected BB ingestions (<12 hours) that are called-in or transferred to the ED, recommend **immediate** administration of oral Honey (or Carafate) per ED CIP 5-10[2]

Determine size and location of BB[2]

If button battery is located beyond the pylorus, guideline does not apply, consult GI

ESOPHAGEAL
Consult Surgery Immediately*

Emergent Removal

Goal Is Removal Within 2 Hours

GASTRIC
Consult GI Immediately

Emergent Removal If:
- **Symptomatic[1], OR**
- **Magnet co-ingestion**

Goal Is Removal Within 2 Hours

GASTRIC
Consult GI Immediately

Removal Within 24 Hours If:
- Multiple battery ingestion, OR
- Patient ≤ 6 years old, OR
- Battery ≥ 15 mm[2]

GASTRIC
Consider D/C If All Criteria Met:

Consult GI prior to D/C
- Asymptomatic[1]
- BB <15 mm in size
- Patient ≥ 7 years old
- Otherwise healthy patient

Endoscopic Removal

Evaluate Esophageal Damage
Flush with 50-150 ml sterile 0.25% acetic acid If no evidence of esophageal perforation

If low risk of complications and/or shorter duration of BB exposure

Outpatient/ Inpatient management as recommended[4,6]

Repeat X-ray in 7-14 days if no battery passage

Patient to return if symptomatic[1,6]

Esophageal Damage

Place NG tube during endoscopy, unless evidence of esophageal perforation[5]

Minimal Hospital Stay is 14 days

No Esophageal Damage

Do NOT Place NG tube

May extubate in OR/PACU as clinically indicated

Post Endoscopy Management
- Admit:
  - PICU if concern for airway management
  - Gen Care, admit to GI service within 24hrs of admission
- If NG is in place, begin enteral feeds
- Within 72hrs Perform Lateral neck X-ray and Esophagram **(complete prior to starting PO feeds)**
- Consider swallow study (OPMS) if symptomatic (dysphagia) and normal esophagram
- Start IV antibiotics-Unasyn[4] as clinically indicated

If Metal Fragments are present:
X-ray must be repeated to confirm fragments have cleared before MRI on day 13 post removal

Consult:
- Surgery- All
- GI- All
- Aortic Inflammation- CT Surgery
- Tracheal Inflammation- ENT
- CCM- if requiring PICU

Transfer to AMBH
If concern for CV involvement transfer to AMBH at same level of care.

MRI on Day 13-15 post removal[3]
- If MRI indicates ≥ 50% circumferential inflammation around Aorta/Great vessels, a CTA should be completed within 14-17 days post removal

If CTA is abnormal consult CV surgery and Button Battery Guideline Team for a Case Review

Discharge[6]
- Medically Stable
- Tolerating soft diet
- MRI shows stable or improved inflammation around Aorta/Great vessels
- Follow up with GI 4 weeks after injury for a repeat Esophagram

***ESOPHAGEAL EMERGENT REMOVAL:**
Scottish Rite and AMBH: The Surgery group will retain primary responsibility for removal of the battery and making immediate post removal decisions (including involvement of GI and transfer to PICU).

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Notes and Recommendations

[1]Suspect Button Battery (BB) Ingestion

- Patient with abrupt onset of any one of the following: refusal of oral intake, difficulty swallowing, chest pain, drooling, airway obstruction, or wheezing or stridor without typical prodromal symptoms of viral illness.
- Presumed "coin" shape ingestion.
- **For patients presenting to an Urgent Care center with BB ingestion, immediately begin Honey/Carafate and contact Transfer Center for Emergent transfer to AMBH or SR.**
- Batteries located in the esophagus may be asymptomatic initially. **Do not wait for symptoms to appea**r. Serious burns can occur within 2 hours.
- Do not induce vomiting or give cathartics
- Consult the National Battery Hotline at 800-498-8666 (or 202-625-3333) as needed for assistance in battery identification & patient management

Symptoms of BB ingestion include:
Occult or visible bleeding, persistent or severe abdominal pain, vomiting, signs of acute abdomen and/or fever, and/or profoundly decreased appetite (unless symptoms unrelated to battery ingestion)

[2]Determine BB Size and Location

- Honey/Carafate is recommended for all known or suspected BB ingestions **within the past 12 hours** (increased risk of esophageal perforation if >12 hours) See **ED CIP 5-10: Patients Presenting with Suspected Foreign Object**
- Begin honey/Carafate once BB ingestion suspected. If X-ray shows **esophageal location**, continue until patient reaches the OR. Discontinue if battery located in the stomach.
  - If ≥12 mo. give honey 10 ml PO Q10 min, max 6 Doses*
  - If <12 mo. give Carafate 1g PO Q10 min, max 3 doses*

**May exceed max doses per MD order*

- **1 honey packet (9.2 ml) is acceptable substitute for 10 ml dose**
- **Chemical content & diameter of the BB can be determined from imprinted code found on the battery case**
- **Assume hearing aid BB's are <12mm**
- **Cylindrical batteries pose a lower threat for caustic damage after ingestion than BB, but due to their size may become trapped in the stomach. Any cylindrical battery ingestions warrant prompt x-ray evaluation & urgent endoscopic removal if located in the esophagus.**
- **Removal of gastric BB <15mm at the discretion of consulting provider**

[3]Radiology

- For all suspected BB ingestions, Foreign Body Series to include: AP x-ray nose to rectum & lateral x-ray neck. If circular metallic foreign body identified in chest, obtain lateral x-ray of chest to evaluate position of negative battery pole.
- Esophagram should be performed as "pull back" esophagram with contrast injected through enteric tube by radiology
- MRI on Day 13-15 post removal for all patients with BB removal (not to be done afterhours or on weekends without direct permission of radiology attending physician).
- MRI to be limited sequence study (about 20 minutes in length).
- Need for sedation/anesthesia for MRI is at the discretion of clinical team

[3]Radiology Cont'd

Potential MRI findings that might trigger additional imaging and/or clinical intervention.

- Proximal Esophageal injury (above carina T5) + tracheal wall thickening
- Proximal esophageal injury (above carina T5) + edema/enhancement involving >50% circumference of Aorta/Great vessels
- Mid-distal esophageal injury (below carina T5) + edema and enhancement involving >50% circumference of descending thoracic aorta

- For Complicated cases may request a case review by the Button Battery Guideline Team & Consider repeat MRI on Day 20 post removal

Management and Follow-up

[4]Inpatient Management

- **All NG tubes placed under endoscopy must be non- weighted, MRI compatible, Bridle feeding tubes.**
- If NG tube becomes dislodged, contact provider. Caregiver should not attempt to replace NG at bedside.
- Patients with button battery removal esophageal should be admitted.
- Once PO feedings advanced, patient must remain on soft diet until D/C
- If battery removed from upper esophagus, monitor closely for voice changes, respiratory distress, or stridor due to possible vocal cord paralysis.

Antibiotics: Unasyn 50 mg/kg IV Q6H (max dose 2000 mg). If PCN allergy: Clindamycin 10 mg/kg IV Q8H (max dose 900 mg). Length of antibiotics should be determined by extent of injury

- If severe inflammation, mediastinitis, suspected perforation, and/or s/s of SERS or systemic infection (i.e. fever, ↑WBC, ↑ CRP), antibiotics may be administered for a min. of 7-10 days.
- In other cases, course of antibiotics to be determined by care team

[5]Discharge Criteria

- MRI shows stable or improved inflammation around aorta/great vessels
- **Patient tolerating soft diet**
- Patient to follow up with GI 4 weeks after battery removal for a repeat Esophagram to evaluate for persistent mucosal irregularity, stricture, and delayed perforation

[6]Outpatient Management

- Button batteries that have cleared the stomach usually pass the GI tract within 1 week without complications.
- Anticipatory guidance to include close monitoring for bloody emesis, melena, cough, and fever, and/or abdominal pain
- Patients with symptoms of abdominal pain, hematochezia, or fever should seek immediate medical attention for emergent X-rays.
- **Prompt surgical removal is indicated for symptomatic patients with radiographic confirmation of a retained intestinal Button Battery**

Potential Complications

- After removal, if mucosal injury was present, observe for and anticipate delayed complications: tracheoesophageal fistula, esophageal perforation, mediastinitis, vocal cord paralysis, tracheal stenosis, tracheomalacia, aspiration pneumonia, empyema, lung abscess, pneumothorax, spondylodiscitis, or exsanguination from perforation into a large vessel.
- Complications may be delayed for up to 30 days post ingestion.
- Consider battery proximity to the aorta or major vessels. If less than 3 mm tissue between area of esophageal injury and adjacent vessels on MRI/CTA monitor closely for sentinel bleeds. Involve cardiothoracic and vascular surgery early if possibility of impending esophageal-vascular fistula.