

Fatal Button Battery Ingestions: 59 Reported Cases

| Case # | Year Reported | Author (or MMWR case # if applicable) | Age | Sex | Imprint | Diam (mm) | Chemistry | Intended Use | Time to Removal | Battery Location | Complications | Signs & Symptoms | Procedures and Treatment |
|--------|---------------|---------------------------------------|-------|-----|---------|-----------|-----------|--|--|--|---|--|---|
| 1 | 1977 | Blatnik | 2.5 y | M | PX 825 | 23 | MnO2 | movie camera | ≥26 hours | upper esophagus at thoracic inlet | massive hematemesis, shock, cardiac arrest 8 days post removal (≥9 days post ingestion); tracheoesophageal fistula; erosion of inferior thyroid arteries and veins; exsanguination into bronchi and lungs | vomiting, fever, lethargy, aphonia, inability to swallow, tender swelling suprasternal notch, tracheal shift, increased WBC | endoscopic removal from esophagus; steroids (presumed to have masked progression) |
| 2 | 1979 | Shabino | 16 mo | F | PX 825 | 23 | MnO2 | camera flash | ≥4 days | upper esophagus | Perforation of esophagus and right tension hydropneumothorax (~4 days post ingestion); widened mediastinum - drain inserted (~5 d post ingestion); aorto-esophageal fistula - perforation of posterior aspect of aortic arch near origin of left subclavian (~5 d post ingestion); massive exsanguination; cardiac arrest | vomiting, fever, irritability, abdominal distention, tachypnea, 10% dehydration, acrocyanosis | tube thoracostomy (~4 days post ingestion); battery removal by esophagoscopy (~4.5 days post ingestion); mediastinal drain and gastrostomy feeding tube inserted (~5 days post ingestion) |
| 3 | 1991 | Peralta | 11 mo | F | unk | 15 | unk | watch | >30 hours | upper esophagus | extensive bilateral pneumonia, anemia requiring transfusion; tracheoesophageal fistula 3x2.5 cm diameter | fever, cough, vomiting, rejecting food and fluids; respiratory distress; cyanosis; pallor | endoscopic removal |
| 4 | 1994 | Sigalet | 3 y | F | unk | unk | unk | unknown | unknown | upper esophagus | aorto-esophageal fistula (presumed, no post done); presumed mediastinal abscess (air at impaction site and sepsis) | dysphagia; fever; dehydration; elevated white blood cell count; sepsis; massive bright red bleeding from mouth 5 days post removal | endoscopic removal; granulation tissue seen |
| 5 | 2004 | Chang YJ | unk | U | unk | unk | unk | unknown | ~2 days before death (not removed) | esophagus | esophageal perforation leading to pneumothorax and pneumoperitoneum; died suddenly in ER | intractable cough; poor appetite | none |
| 6 | 2004 | BBC News and telegraphco.uk | 13 mo | M | unk | unk | unk | camera | 11 days in esophagus, never diagnosed or removed | upper esophagus or hypopharynx with damage to trachea (presumed tracheoesophageal fistula) | ulcerated esophagus with tracheoesophageal fistula and bleeding; respiratory failure; death | repeated vomiting, breathing difficulty; wheezing, difficulty drinking and eating, weight loss; misdiagnosed as viral infection | no x-ray done thus diagnosis missed despite hospitalization |
| 7 | 2004 | NBIH (MMWR 3) | 2.5 y | M | CR 2032 | 20 | lithium | remote control of portable stereo system ("boombox") | ≥10 days | upper esophagus | aorto-esophageal fistula (estimated 10 days post ingestion); massive exsanguination; cardiac arrest | unresponsive, dyspnea, hematemesis, melena | battery removal by rigid esophagoscopy; emergency thoracotomy for massive bleeding uncontrolled by ET and balloon catheters in esophagus; open cardiac massage |
| 8 | 2005 | Hamilton & NBIH (MMWR 4) | 19 mo | M | unk | unk | lithium | garage door opener | 1 day | 2 batteries ingested: one in stomach, one in mid-esophagus | 2 cm aorto-esophageal fistula at proximal descending aorta; massive bleeding and death 10 days after battery removal | presented with 1 day of abdominal pain, shallow respirations, lethargy, anorexia, cough; massive bleeding from aorto-esophageal fistula 10 days post battery removal | battery removal by esophagogastrosopy; contrast swallow post-op day 4 suggested walled off tract along distal esophagus; child discharged; developed cyanosis and lethargy suddenly at home; CT showed IV contrast in esophagus & stomach; thoractomy - cross-clamped hypovolemic aorta |

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| 9 | 2008 | NBIH & Mortenson | 15 mo | M | CR 2032 | 20 | lithium | electric candle | not removed; in place 2 weeks | esophagus at level of tracheal bifurcation | aortoesophageal fistula - child exsanguinated 2 weeks after ingestion; blood in stomach and first part of duodenum on post; erosions in esophagus at level of tracheal bifurcation; fistula a few mm in diameter | fussy, crying, dark stools with suspected blood; respiratory problems | battery never removed as diagnosis not made until post mortem done |
| 10 | 2008 | NBIH & Brumbaugh (MMWR 7); Leinwand (Case 2) | 16 mo | F | CR 2025 | 20 | lithium | unknown | suspect ingested 7 - 13 days prior to removal | mid-esophagus; moved spontaneously to stomach | esophageal erosions with small amount of blood in paraesophageal and para-aortic tissues; child arrested (from blood loss) in OR and could not be resuscitated | hematemesis | vomited blood a second time just prior to planned endoscopic removal - exploratory laparotomy done instead; clot and battery evacuated from stomach; clotted blood formed cast of distal esophagus and stomach |
| 11 | 2009 | NBIH & Brumbaugh (MMWR 7); Leinwand (Case 3) | 2 y | F | CR 2032 | 20 | lithium | Yahtzee toy | 10 hours | distal esophagus | aortoesophageal fistula | projectile vomiting of blood 18 days after battery removal | endoscopic removal of battery from esophagus |
| 12 | 2009 | NBIH (MMWR 8) | 2.5 y | M | unk | unk | unk | receiver unit for remote control light switch | 4-5 days | upper esophagus | exsanguinated; fistula between esophagus and right subclavian artery | vomiting only with solid food x 4-5 days; tolerated liquids; otherwise acting normally; hematemesis 4-5 days post ingestion, then into shock | resuscitation; balloon in esophagus to attempt to control bleeding |
| 13 | 2009 | NBIH (MMWR 10) | 13 mo | M | CR 2032 | 20 | lithium | unknown | 10 days | removed from stomach; suspect lodged in mid esophagus then dropped to stomach | aortoesophageal fistula with massive exsanguination 2 days post removal and 12 days post ingestion | coughing; gagging; chest congestion; vomiting; refusal to eat; guaiac positive, tarry stools; massive hematemesis 2 days after battery removal | endoscopic removal of battery from stomach 10 days post ingestion; battery presumed to have moved to stomach from esophagus |
| Fatalities 1 to 13 above were included in the publication: | | | | | | | | | | | | | |
| Litovitz T, Whitaker N, Clark L, White NC, Marsolek M: Emerging battery ingestion hazard: Clinical implications. Pediatrics 2010;125(6): 1168-77. epub 24 May 2010. | | | | | | | | | | | | | |
| Cases below occurred or were identified after compilation of data for this publication. | | | | | | | | | | | | | |
| 14 | 2010 | NBIH (MMWR 14) | 2 y | F | CR 2025 | 20 | lithium | unknown | not removed (unknown time of ingestion) | mid-esophagus | aortoesophageal fistula 5 cm above gastroesophageal junction | hematemesis; exsanguinated | orogastric tube placed and battery dislodged to stomach |
| 15 | 2010 | Soerdjbalie-Maikoe | 2 y | F | CR 2032 | 20 | lithium | unknown | 11 days | mid-esophagus | aortoesophageal fistula between aberrant right subclavian artery (arteria lusoria) and esophagus; hemothorax, blood throughout gut on post mortem; focal mediastinitis; esophageal perforation and esophagitis | sore throat, high fever, cough, diarrhea, vomiting after every drink or meal, seizure, hypotension, anemia, melena, hematemesis, collapse | thoracotomy |
| 16 | 2010 | Baeza Herrera | 3 y | M | unk | 20 | lithium | remote control for video player | 1 day | mid-esophagus | aortoesophageal fistula developed 11 days post ingestion (10 days after removal); liquid diet started on day 6 and child was asymptomatic; sudden hematemesis occurred and child exsanguinated from hemorrhagic shock in the hospital despite attempts to resuscitate; autopsy showed burns throughout esophagus and 3 cm perforation in distal third of esophagus into the thoracic aorta; large amounts of blood were found in the stomach and the cardiac chambers were empty | initial abdominal pain and vomiting; asymptomatic by day 6; hematemesis 11 days post ingestion (10 days post removal) | endoscopic removal of battery from esophagus; repeat diagnostic endoscopy on day 10 |

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| 17 | 2011 | LaFrance (MMWR 11) | 3 y | F | CR 2032 | 20 | lithium | unknown | unk, <3 weeks | upper esophagus, at thoracic inlet | hemoptysis, exsanguination and aspiration of blood; tracheoesophageal fistula | T&A 3 weeks prior to death obscured determination of time of onset of symptoms; 10 days post T&A evaluated for fever and refusal of solid foods; 3 weeks post T&A presented with respiratory distress and vomiting, O2 sat 94% on room air, tachypnea; CXR showed diffuse bilateral infiltrates and coin-like foreign body in esophagus at thoracic inlet; removal scheduled for next day but patient developed coughing spells and marked hemoptysis requiring intubation and transfusion; acute bradycardia and bleeding from mouth, nose, and ET tube followed | intubation, transfusion, unsuccessful resuscitation attempts (stabilized after 30 mins of resuscitation but pupils fixed and dilated, then another episode of massive hematemesis occurred and resuscitation was unsuccessful) |
| 18 | 2011 | NBIH & Pae | 4 y | F | unk | 20 | lithium | unknown | unknown | distal esophagus | aorto-esophageal fistula | child vomited blood and collapsed at home; unresponsive with no pulse or breath sounds on arrival in ED; CPR initiated; pH dropped to 6.9; hemoglobin undetectable; regained spontaneous circulation with fluids and blood; no prior symptoms; ingestion not witnessed; apneic and pulseless on arrival at ED | thoracotomy showed aorto-esophageal fistula; aorta cross-clamped but child continued to bleed; arrested in OR and could not be resuscitated; battery not removed |
| 19 | 1998 | MMWR 1 | 16 mo | F | unk | unk | unk | unknown | unk | esophagus | exsanguination from arterio-esophageal fistula | unknown | unknown |
| 20 | 2002 | MMWR 2 | 15 mo | F | CR 2016 | 20 | lithium | toy watch? | >24 hours | proximal esophagus | exsanguination from aorto-esophageal fistula | vomiting, melena, hemorrhaging; symptoms developed > 5 hours post ingestion | battery identified on x-ray 19 hours after symptoms developed (>24 hours post ingestion) |
| 21 | 2006 | MMWR 5 | 1 y | M | unk | unk | alkaline | remote car alarm | ≥4 days | esophagus | tracheoesophageal fistula; anoxic encephalopathy secondary to TE fistula | fever, decreased appetite, suspected croup | child taken to hospital after 2 days of fever; diagnosed with croup and discharged. Returned 2 days later at which point a radiograph showed a battery in the esophagus. Battery removed but child died 6 days later. |
| 22 | 2007 | MMWR 6 | 7 mo | F | unk | unk | unk | unknown | unk | proximal esophagus | acute fistulous erosion of esophageal ulcer into carotid artery | massive hematemesis | battery removed endoscopically |
| 23 | 2010 | MMWR 12 | 2 y | F | unk | unk | unk | unknown | ≥5 days | upper thoracic esophagus | esophageal perforation; bleeding | sore throat, dysphagia, choking, dyspnea, tachypnea, dark stools, listless | child treated for strep by pediatrician; taken to ED 5 days later where an x-ray identified foreign body in esophagus. Battery removed in hospital where child died 2 days later. |
| 24 | 2010 | MMWR 13 | 2 y | F | CR 20xx | 20 | lithium | unknown | unk | esophagus | esophageal damage, necrosis and hemorrhage; esophageal tear | vomited blood, cardiovascular collapse | Unknown time of ingestion. Child "became ill" and vomited blood. Condition deteriorated after transfer from initial hospital. Died at hospital. |
| 25 | 2011 | MMWR footnote | 13 mo | F | unk | 20 | lithium | watch | unk | esophagus | unknown | unknown | unknown |
| 26 | 2011 | MMWR footnote | 3 y | M | unk | unk | unk | unknown | unk | esophagus | aorto-esophageal fistula | hemorrhage | unknown |
| 27 | 2012 | MMWR footnote | 4 y | M | AAA (initial report button battery) | AAA | unk | unknown | 4 days | mid esophagus | two fistulas: esophagus to aorta and esophagus to pulmonary artery | initial choking and vomiting; refusal to eat, abdominal pain and fever developed over next day or so; throat pain reported 4 days after swallowing battery; child had multiple pre-existing medical problems (DiGeorge syndrome, right aortic arch with aberrant origin of left subclavian artery, arthritis treated with NSAIDs); 32 days post ingestion he developed nose bleed and hematemesis then arrested and could not be resuscitated due to massive bleeding | battery removed from esophagus by rigid esophagoscopy with the aid of a balloon catheter; child died 32 days post ingestion (28 days post battery removal) |

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| 28 | 2012 | CPSC; NBIH | 2 y | F | unk | 20 | lithium | unknown | ~8 days | esophagus | esophageal-carotid fistula; battery removed from upper esophagus; 3 weeks later child presented with gastric bleeding and seizures; large necrotic mass in neck on MRI and peptic ulcer with blood clot; transfused and placed on ventilator; one day after admission began to vomit blood, went into cardiac arrest and could not be resuscitated | gastric bleeding; seizures; necrotic mass in neck; peptic ulcer with blood clot; hypotension | battery removed from upper esophagus |
| 29 | 2012 | NBIH | 13 mo | M | DL 2032 | 20 | lithium | unknown | unk | battery in stomach; bleeding site identified on post mortem | gastric erosions; massive upper GI bleed followed several hours after a sentinel single episode of hematemesis | sentinel episode of hematemesis preceded massive upper GI bleed | none |
| 30 | 2013 | Martinez | 23 mo | M | unk | 20 | lithium | unknown | unk | proximal esophagus (thoracic inlet) | esophageal ulceration; aorto-esophageal fistula in upper esophagus | odynophagia, sialorrhea, stridor x 2 weeks prior to presentation without improvement with steroids; repeated hematemesis following attempted battery removal; hemorrhagic shock treated with blood and pressors and CPR | endoscopic removal of battery from esophagus attempted but battery displaced to stomach; unable to cauterize bleeding in esophagus on repeat endoscopy |
| 31 | 2013 | NBIH; media; Taghavi | 4 y | F | unk | 20 | lithium | unknown | ≥2 weeks | mid esophagus | aorto-esophageal fistula at aortic arch near origin of left subclavian artery; death from hemorrhage | presented with epistaxis following 2 weeks of abdominal pain and melena; discharged home; vomited a cup of fresh blood at home and brought back to the ER in shock; massive hematemesis and coma followed | intubated; chest x-ray performed to confirm ET tube position showed mid-esophageal battery; transfusions; CPR; thoracotomy showed large, tense mediastinal hematoma |
| 32 | 2010 | NBIH 735607 (this case is duplicated on Severe Cases list, case 89; child died nearly 2 years and 10 months after ingestion) | 10 mo | F | unk | 20 | lithium | unknown | >8 hours | cervical esophagus | tracheoesophageal fistula; died (found unresponsive) nearly 2 years and 10 months after the battery ingestion | initial gasping and choking; cyanosis. Stridor developed | tracheostomy required; unknown other procedures |
| 33 | 2013 | NBIH | 16 mo | M | CR 2025 | 20 | lithium | unknown | ~7 days | proximal esophagus | massive upper GI bleed of undetermined origin; possible concomitant acetaminophen toxicity (used to treat child prior to removal); child died approximately 3 days after removal; there was evidence of pulmonary edema, pneumonia, uncontrollable esophageal bleeding and mediastinitis in addition to renal and liver failure | presented initially with cough and congestion; later developed profoundly elevated INR, PTT, AST, ALT; Hct dropped to 17; hypotensive with hematemesis, melena, and acidosis | exploratory lap done to decompress abdomen due to massive bleeding with prolonged intraoperative arrest; bright red blood in lower esophagus and stomach |
| 34 | 2013 | NBIH | 23 mo | M | unk | unk | unk | camera | unk | esophagus | GI bleed, laceration of the esophagus, collapsed lung, gastric irritation | hematemesis | unknown |
| 35 | 2014 | Takesaki | 5 y | M | unk | ~20 | lithium | unknown | ~10 days or more | injury in distal esophagus; battery passed to lower colon spontaneously | deep ulceration of lower esophagus; presume esophageal-vascular fistula but not confirmed; massive hematemesis; profound hypotension; two cardiopulmonary arrests | abdominal pain x 10 days followed by hematemesis, pallor, tachycardia (150 beats/min), hypotension (60 mm Hg), and Hct 27% | UGI endoscopy demonstrated deep ulcerated lesion in distal esophagus; additional profuse hematemesis followed the endoscopy accompanied by severe hypotension; Sengstaken-Blakemore tube inserted; cardiopulmonary arrest followed, resuscitated with CPR and epinephrine; subsequent exploratory laparotomy showed a large amount of blood in the stomach; child arrested again and could not be resuscitated; battery removed manually per rectum |

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| 36 | 2014 | Hamawandi | 28 mo | M | unk | unk | unk | unknown | ≥5 days | esophagus | esophageal perforation; child died at home on 7th day (family refused surgery and discharged child) | unknown | family refused treatment |
| 37 | 2013 | Connor L (News) | 1 y | F | unk | unk | unk | torch | ~1 day | esophagus | aorto-esophageal fistula | massive bleeding | battery removed from esophagus; child discharged from hospital; returned 8 days post ingestion (6 days after removal) with massive bleeding; heart abnormality detected on post mortem |
| 38 | 2014 | News | 4 y | F | unk | 20 (suspected due to coin-like description) | lithium (suspected due to coin-like description) | unknown | unk | esophagus | massive upper GI bleed, presumed to be an esophageal-vascular fistula | presented with difficulty breathing; hematemesis developed about 7 days later | battery removed; child died about 7 days post removal; massive hematemesis developed when NG tube was removed |
| 39 | 2014 | Mercer RW | 4 y | M | CR 2032 | 20 | lithium | unknown | ≥2 days | upper esophagus, at level of aortic arch | child with trisomy 21, diagnosed with a vascular ring at the time of button battery ingestion; died 9 days after presentation due to massive upper GI bleeding from a vasculoesophageal fistula; patient found unresponsive in hospital room; during intubation, massive amounts of bright red blood emerged from esophagus; hypotension and acidosis followed; resuscitation unsuccessful; post mortem showed a necrotic transmural ulceration of the esophagus; blood found in stomach and small intestine; the vascular ring caused esophageal narrowing due to external compression | presented with 2 days fever, difficulty breathing and decreased oral intake; no known cardiovascular history but reported longstanding intolerance of solid foods with frequent vomiting | endoscopic removal revealed extensive avascularity, blanching and necrosis on posterior, left lateral and anterior esophageal walls; obstructed esophageal lumen; microlaryngoscopy and bronchoscopy showed no tracheal involvement; post-op CT angio showed right aortic arch with an aberrant left subclavian artery originating from a Kommerell diverticulum consistent with a vascular ring; Kommerell diverticulum adjacent to a contained esophageal perforation (3.3x2.9 cm air fluid collection); repeated flexible and rigid endoscopy with NG tube placement and bronchoscopy 2 days post removal |
| 40 | 2014 | Times Live | 2 y | F | unk | unk | unk | unknown | ~2 weeks | esophageal-vascular fistula (unspecified artery involved) | massive upper GI bleed, presumed to be an esophageal-vascular fistula | sore throat and chest over 2 weeks; began vomiting blood Oct 19, 2014; rushed to hospital; died hours later | unknown |
| 41 | 2014 | BBC News | 3 y | F | unk | unk | unk | unknown | unk | unk | unknown | severe hemorrhage | unknown |
| 42 | 2015 | Barabino | 22 mo | F | CR 2032 | 20 | lithium | unknown | unk | mid esophagus | aorto-esophageal fistula due to lithium battery lodged in mid esophagus (found on autopsy) | bloody emesis occurred once an hour prior to admission; slight pallor, mild tachycardia and Hgb 7.7 g/dL on presentation; Hgb dropped to 6.2 g/dL 5 hours later without evidence of ongoing bleeding; almost 8 hour after presentation, sudden severe hematemesis occurred followed by cardiorespiratory arrest; resuscitation attempted over 2.5 hours but upper GI hemorrhage was uncontrollable | resuscitation attempted (transfusion, ventilation, cardiac massage); battery not removed prior to death |

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| 43 | 2015 | Chow; Mannix | 14 mo | F | CR 2025 | 20 | lithium | unknown | 2-3 weeks | distal esophagus | aorto-esophageal fistula due to lithium battery lodged in the esophagus | 2 to 3 weeks of nonspecific symptoms (vomiting, lethargy, refusal of food and fluids, fever, abdominal pain, difficulty settling, dark green stool) diagnosed as urinary tract infection, including 3 ED presentations; acute onset hematemesis with large clots was followed by cardiac arrest; resuscitation was successful but further hematemesis resulted in a second cardiac arrest and she could not be resuscitated | battery not removed prior to death |
| 44 | 2015 | NBIH | 17 mo | F | unk | 20 | lithium | unknown | not removed prior to death | mid esophagus | death due to exsanguination from fistula from esophagus to aberrant right subclavian artery | exsanguinated on arrival to emergency department; presented with hematemesis and hemoptysis; sentinel bleed: melena 7 days prior to presentation; unremitting hematemesis progressed to cardiac arrest | crash thoracotomy; unsuccessful attempt to repair injury |
| 45 | 2015 | Sarkar | 3 mo | M | unk | 20 | lithium | unknown | ~ 36 hours | upper esophagus (C5-6 level) | large tracheoesophageal fistula; severe ARDS with pulmonary hemorrhage leading to death ~ 10 days post ingestion and 5 days post TE fistula repair | refusal to suck; excessive crying and drooling; tachypnea; severe respiratory distress developed 4-5 days after removal with hyperextension of the neck | endoscopic battery removal; thoracotomy to repair TE fistula; esophagostomy; feeding jejunostomy; mechanical ventilation |
| 46 | 2015 | Stogsdill; NBIH | 2 y | F | CR 2032 | 20 | lithium | tea light (loose spare) | ≥4 days | esophagus | massive hemorrhage; esophageal-vascular fistula | fever and vomiting for about 4 days prior to presentation; massive hematemesis; cyanosis | surgical attempt to control bleeding and resuscitate child |
| 47 | 2016 | Guinet | 17 mo | F | CR 2032 | 20 | lithium | unknown | not removed prior to death | upper esophagus | esophageal ruptures (lengthwise at right posterior esophageal wall and at the left anterior esophageal wall in contact with left carotid artery but not completely perforated); large amount of blood aspirated into bronchi; coma; prehospital cardiac arrest; postmortem tox analysis showed heavy metals in elevated but nontoxic concentrations | hematemesis; coma; cardiorespiratory arrest; ER evaluation for bronchitis and nasopharyngitis 18 and 14 days prior to death | prehospital arrest; CPR unsuccessful |
| 48 | 2015 | Zarei | 3 mo | F | unk | unk | unk | unknown | ~2 days | proximal esophagus | tracheoesophageal fistula | 2 days of vomiting, cough, intolerance of milk, and agitation; cough, dyspnea and cyanosis developed 12 hours post removal | laryngoscopic removal of battery from esophagus; tracheoesophageal fistula repair; child died in hospital 3 days later |
| 49 | 2016 | Rockett (Mirror News); Crouch (The Sun) | 2 y | F | unk | 20 | lithium | 3D TV glasses | not removed prior to death | esophagus | massive hemorrhage; esophageal battery eroded into subclavian artery | "very sick"; died within a couple hours of hospital presentation; had been symptomatic for ~8 days but diagnosis was missed | unknown |
| 50 | 2015 | CPSC | 18 mo | M | unk | 25 | lithium | unknown | ~9 days | esophagus | esophageal perforation; hemorrhage | vomiting; fever, dyspnea, blood per rectum 11 days post-removal | endoscopic removal of battery from the esophagus; feeding gastrostomy; blood transfusion; surgical repair of esophageal perforation |
| 51 | 2017 | NBIH | 2 y | F | CR 2032 | 20 | lithium | unknown | 24-36 hours | esophagus | hematemesis pre- and post-endoscopy; child died of massive bleed about 10 hours after presenting to ER with hematemesis; esophageal erosions | presented to ER with hematemesis. Xray showed battery in esophagus | endoscopic removal of battery 1-2 hours after initial x-ray. Unable to remove battery so it was pushed into stomach and not removed prior to death. |

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| 52 | 2016 | Nisse | 4 y | F | CR 16?? | 16 | lithium | key fob | 3 days | mid-esophagus | aorto-esophageal fistula; ulceration and necrosis noted at left posterior esophagus during removal; massive exsanguination began on the 6th hospital day, with hemodynamic collapse, two seizures and bradydysrhythmias | abdominal pain; refusal to eat solid foods; drooling; fever; subcutaneous emphysema | battery removal by rigid endoscopy under general anesthesia; oral feeding was resumed on the 6th hospital day; surgical attempts to repair the fistula showed extension of the battery injury into the postero-inferior aspect of the aortic arch and a fistula between the origin of the left carotid and the esophagus. The child died despite surgery. |
| 53 | 2016 | NBIH | 12 mo | M | CR 2032 | 20 | lithium | remote control for sound bar (home theater) | 5.5 - 6 hours | upper esophagus | perforation of esophagus into mediastinum; tracheoesophageal fistula diagnosed 17 days post ingestion; healing; child doing well and TEF closing spontaneously; respiratory failure developed relatively suddenly 80 days after battery removal | vomiting prior to removal | battery removed under laryngoscopic view |
| 54 | 2016 | Bhosale | 2 mo | M | unk | 10 | unk | toy | ~5 days | upper esophagus | large tracheoesophageal fistula just below cricopharynx diagnosed on esophagoscopy 8 days after battery removal; mediastinitis; sepsis; bile reflux developed and child succumbed to sepsis 15 days after battery removal | fever, respiratory distress, irritability x 5 days | battery removal from esophagus by rigid esophagoscopy; unable to place infant feeding tube; intubated and on ventilator x 3 days; reintubated 10 days after battery removal due to abdominal distension and respiratory compromise. Deflating gastrostomy and feeding jejunostomy were done |
| 55 | 2016 | Ventura | 18 mo | F | CR 2032 | 20 | lithium | unknown | not removed prior to death; unknown time of ingestion | mid esophagus | aorto-esophageal fistula with massive amounts of blood in the bronchi, stomach and small bowel; deep ulceration in esophagus | vomiting blood; severe anemia (Hgb 6.2g/dL); tachycardia; loss of consciousness | intensive resuscitation efforts were unsuccessful |
| 56 | 2017 | Boba | 1 y | M | unk | 20 | lithium | unknown | >2 hours | proximal esophagus | local necrosis and edema; esophagitis, mediastinitis and microperforation; septic shock with multiple-organ failure, acidosis, clotting disturbances and acute anemia | sialorrhea on presentation; condition worsened on day 3 with sudden onset of tachypnea, tachycardia and fever | removal by rigid esophagoscopy; antibiotics; parenteral nutrition; blood transfusions; bicarbonate |
| 57 | 2017 | Safi | 2 mo | M | unk | ≥20 mm | lithium | battery fed to child by older brother | 24-36 hours (spontaneous passage); in esophagus <3 hours, then passed to stomach | cervical esophagus | ulcerative esophagitis of cervical esophagus; esophageal stenosis; death | esophageal stenosis noted on day 8 with respiratory distress and abdominal bloating requiring intubation; pneumonitis; patient died on day 8-9 | battery in stomach on initial xray ≥ 3 hours post ingestion |
| 58 | 2017 | Kroll | 22 mo | M | CR 2032 | 20 | lithium | unknown | not removed prior to death | distal esophagus | aorto-esophageal fistula with massive bleeding; large volume of fresh blood in stomach and blood found in airways; on post mortem, battery was incarcerated in ulcerated granulation tissue | Child hospitalized for 3 days for gastroenteritis and dehydration, then discharged. Two days later experienced sudden onset hematemesis; retrosternal pain; difficulty breathing; cough followed by sudden onset hematemesis, rapid loss of consciousness and cardiac arrest | Cardiopulmonary resuscitation unsuccessful; battery was not removed prior to death |

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| 59 | 2018 | CPSC (NBIH) | 22 mo | F | CR 2032 | 20 | lithium | unknown | unknown | distal esophagus | button battery embedded in esophagus; ulceration and bleeding noted; stomach full of blood clots; cardiac arrest and died 7 hours after presenting to ED; erosion and ulceration over an 3.6 x 3.0 cm area 1.8 cm above GE junction; aorto-esophageal fistula noted on autopsy with pinpoint communication; defect in aortic intima and wall 0.4 x 1 cm | child with no known battery ingestion was evaluated in an ER for an ear infection, cough and cold and sent home. Nine days later she developed bleeding from her nose, then became lethargic and unresponsive; taken to OR to remove battery; cardiac arrest in OR; could not be resuscitated; time of battery ingestion unknown | battery removal from distal esophagus with rigid endoscopy |
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