

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

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

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)

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

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

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.

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

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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