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Case report

Fatal aortoesophageal fistula secondary to button battery ingestion in a young child

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ABSTRACT

We present a case of fatal aortoesophageal fistula in a 14 month old girl. She presented to the emergency department with acute hematemesis. A foreign body in the esophagus was identified on chest X-ray. Despite intensive resuscitation, she went into cardiac arrest and died. In the three weeks prior to death, she had non-specific symptoms; based on an elevated urinary polymorph level and *Escherichia coli* culture, she was diagnosed with a urinary tract infection and prescribed antibiotics. Postmortem imaging revealed a metallic foreign body in the esophagus consistent with a button battery and autopsy revealed an aortoesophageal fistula caused by a 20 mm imprint code CR 2025 button battery. It is unclear how long the battery had been in situ. We highlight the importance of a high index of suspicion for battery ingestion in children, the need for clinicians to recognize a button battery on radiography, and the value of routine postmortem imaging in the detection of findings that may be relevant to the autopsy. Although rare, fatal cases due to button battery ingestion are preventable.

1. Introduction

Although batteries account for less than 2% of foreign bodies ingested in children, they are becoming an increasingly significant hazard [1]. The diameter of an ingested button battery is the most important predictor of a clinically significant outcome. Whilst batteries with a diameter <18 mm generally pass through the gastrointestinal tract without harm, larger batteries can remain lodged in the esophagus and result in severe complications, including death. The growing use of 20 mm lithium button batteries has been associated with an increasing frequency of severe and fatal button battery ingestions, especially in the past decade [2].

Eight cases of button battery-induced aortoesophageal fistulas have been reported in the English medical literature, with only one case documenting survival [3]. In spite of recent public awareness campaigns highlighting the risks of battery ingestion, we present the fatal case of a 14 month old female who developed an aortoesophageal fistula after swallowing a 20 mm button battery.

2. Case presentation

A 14 month old girl presented to the emergency department after an acute episode of hematemesis containing multiple clots larger than 30 mm in diameter and a 24-h history of poor feeding and difficulty settling. On examination, the child was conscious and responsive, but pale and unwell-looking. She had tachycardia of 168 bpm and a blood pressure of 88/50 mmHg. Her nappy contained dark green offensive stool. Venous blood detected a hemoglobin level of 73 g/L and a metabolic lactic acidosis. A chest radiograph was performed and demonstrated a midline, circular foreign body, which was interpreted at the time as a coin.

Attempts to stabilize the child were interrupted, one hour after initial presentation by a further episode of frank hematemesis leading to cardiac arrest. She was successfully resuscitated, but further hematemesis resulting in a second cardiac arrest. She died despite intensive resuscitation.

Review of the deceased's hospital records revealed three presentations to the emergency department over a period of five days, beginning three weeks before death. Reported symptoms were non-bilious vomiting, lethargy, refusal of food and fluids, fever, abdominal pain, difficulty settling and dark green, offensive stool. Her urine had a markedly elevated polymorph level and cultured *Escherichia coli*. She was diagnosed with a urinary tract infection and reviewed two days after beginning antibiotic treatment. Although she continued to be unsettled at night and have green stools, the other reported symptoms had resolved.

Seven hours after death, postmortem chest radiography in lateral and anterior projections demonstrated a round metallic foreign object in the mediastinum (Fig. 1). It was orientated in the coronal plane and projected over the region of the lower esophagus. The

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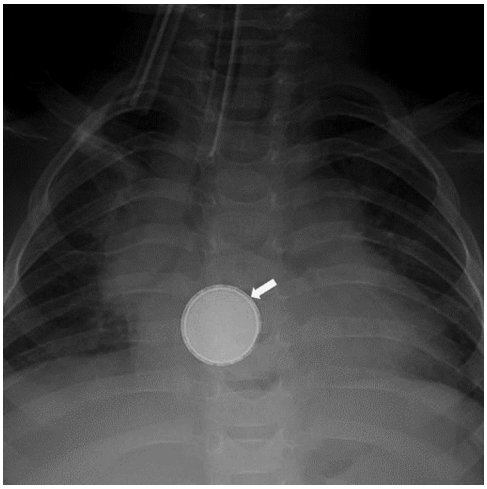

Fig. 1. Anteroposterior chest radiograph demonstrates a round metallic foreign object in the lower esophagus, with a double-rim or halo effect (arrow) characteristic of a button battery.

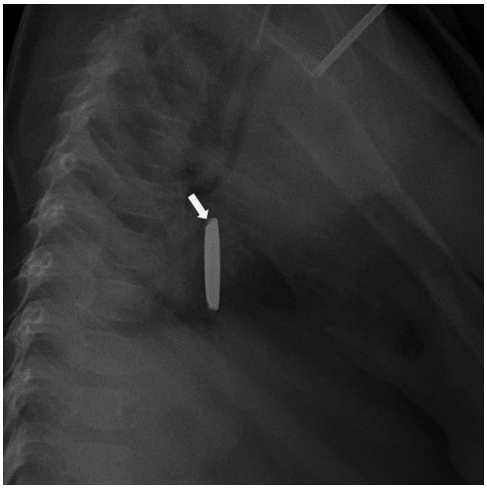

Fig. 2. Lateral chest radiograph demonstrates the characteristic rounded edges and step-off or lip (arrow) of a button battery.

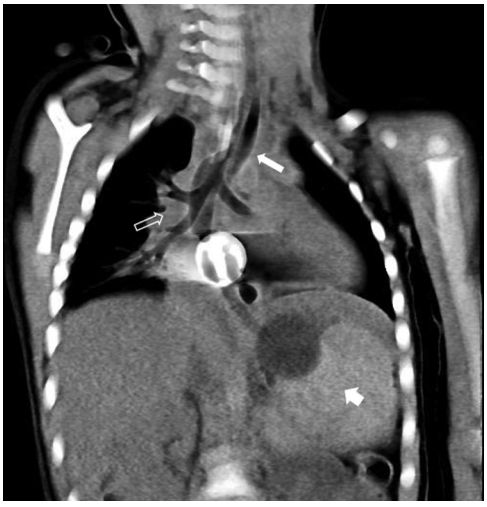

Fig. 3. Axial (a) and oblique coronal reconstruction (b) CT scan of the chest demonstrates the button battery with no gas or fluid collection in the adjacent mediastinum to indicate perforation. Air is seen in the proximal esophagus (solid arrow) and tracheobronchial tree (open arrow), and high density material consistent with blood in the stomach (arrow head).

Fig. 4. 20 mm CR 2025 button battery recovered at autopsy.

foreign body had rounded edges typical of a button battery (Fig. 2). A whole body postmortem CT scan (Siemens SOMATOM Definition Flash, Erlangen, Germany) performed immediately after the x-ray confirmed the radiographic findings. Scanning parameters were 100 kV, 200 mA, slice thickness of 0.6 mm and reconstruction kernel I30f. Despite streak artifact from the foreign body obscuring local soft tissue detail, no gas or fluid collection was identified in the mediastinum above or below the foreign body to indicate mediastinal abscess or esophageal perforation (Fig. 3a and b). High density material of mean Hounsfield unit 63, consistent with blood, was identified in the stomach but there were no obvious effects of prolonged resuscitation, for example no rib or sternal fracture and no pneumothorax. Lungs showed minor bibasal atelectasis. There were no other relevant CT findings.

At autopsy, the foreign object was confirmed to be a button battery with imprint code CR 2025. This is a 3 V lithium battery with a diameter of 20 mm and a thickness of 2.5 mm (Fig. 4). It was located in the esophagus approximately 3 cm above the gastroesophageal junction. There were two linear areas of erosion adjacent to the edges of the battery (Fig. 5). One of these formed an aortoesophageal fistula (Fig. 6). Histology of the fistula showed typical thermal injury associated with granulation tissue, lymphocytes, plasma cells and minor metal fragments together with occasional neutrophils. The wall of the aorta along the fistulous tract showed changes in keeping with a thermal injury. The stomach contained liquid and clotted blood, and melena was found in the large intestine.

3. Discussion

Over 70,000 cases of button battery ingestions have been reported, with an incidence of 3500 annually in the United States. Serious complications from button-battery ingestion such as esophageal burns can occur within two hours of ingestion. If the

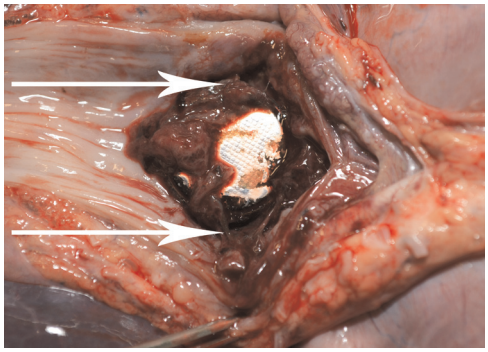

Fig. 5. Button battery lodged in esophagus with two adjacent areas of mucosal erosion (arrows).

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