CASE REPORT

Delayed presentation of button battery ingestion: a devastating complication

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SUMMARY

A 12-month-old child presented with a prolonged history of fever, cough and difficulty breathing, which was initially treated as bronchiolitis. She was discharged but presented again to Accident and Emergency department 4 days later with worsening symptom. Following deterioration in the Emergency department, a chest X-ray revealed a button battery in the upper oesophagus. Emergency oesophagoscopy was performed where a 20 mm button battery was removed and a tracheoesophageal fistula was seen 12 mm above the carina. Near total oesophagectomy, cervical oesophagostomy and gastrostomy were performed with a patch repair of the trachea, followed by a bioabsorbable tracheal stent. The patient spent a prolonged period of time in intensive care and was treated with intravenous antibiotics for mediastinitis. This case highlights the difficulty in diagnosis of button batteries when there is no clear history and the devastating consequences of prolonged exposure.

BACKGROUND

The use of button batteries in common electronic devices, such as children's toys, is widespread and the potential damage caused when ingested has been well documented.¹⁻⁴ A recently published review found that up to 10% of ingested batteries become lodged in the oesophagus, the location where

serious complications are most likely to develop.⁴ Injuries have included oesophageal strictures, perforations, tracheoesophageal fistulas, mediastinitis and aortoesophageal fistulas.^{4,5} The pathophysiology of damage is thought to be associated with the generation of an electrical current when the battery is in contact with mucosa. Caustic burns develop following an accumulation of hydroxide ions leading to necrosis and severe tissue injury.⁵⁻⁷ The severity of damage caused is proportional to the length of time the button battery is lodged prior to removal and therefore early recognition of ingestion is vital.^{5,6} We present a case of a child with a delayed diagnosis of battery ingestion and a severe complication of tracheoesophageal fistula.

CASE PRESENTATION

A 12-month-old girl child presented with a 7-day history of fever, cough, coryza, vomiting and difficulty breathing. The child was diagnosed with bronchiolitis and presented again 4 days later when a course of flucloxacillin was commenced for a chest infection. The symptoms persisted and the next day the child presented again to the Accident and Emergency department with fever, tachypnoea, desaturation and dehydration.

The child was reviewed and treated with salbutamol nebulisers and oral prednisolone for a widespread wheeze. Five hours following presentation, the patient was transferred to the Resuscitation department due to a clinical deterioration with an increased respiratory rate, work of breathing and reduced oxygen saturation. A chest X-ray was, therefore, performed.

The patient was born at full term and had no other hospital admissions prior to this episode. Her only medical history included treatment for suspected chorioamnionitis at birth. She was up to date with immunisations and lived with her family.

INVESTIGATIONS

A chest X-ray was performed in the Resuscitation department, which revealed a circular radio-opaque object in the area behind the manubrium. The *halo* sign was visualised on the anteroposterior view and a *step-off* sign was seen on the foreign body on the lateral view. Both these signs helped to confirm a button battery rather than a coin ((figures 1 and 2).

TREATMENT

Due to the clinical deterioration of the patient and the confirmation of an ingested button battery on

Figure 1 AP erect chest X-ray.

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Figure 2 Lateral soft tissue neck X-ray.

X-ray, an emergency oesophagoscopy was performed by the ENT surgeon and a 20 mm button battery was removed from the mid oesophagus. A 1–2 cm tracheoesophageal fistula was noted at the time of the procedure. (online supplementary video) The patient was transferred to a tertiary paediatric centre following the procedure where flexible bronchoscopy confirmed a tracheal tear 12 mm above the carina, suggestive of an extensive corrosive tracheoesophageal fistula measuring 16 mm. The next day near total oesophagectomy, cervical oesophagostomy and gastrostomy were performed with a patch repair of the trachea.

OUTCOME AND FOLLOW-UP

The patient remained on paediatric intensive care for 25 days. Intraoperative swabs confirmed enterococci, and intravenous antibiotics were commenced for mediastinitis. A bioabsorbable tracheal stent was inserted 25 days later and gastrostomy feeds were commenced. The patient was allowed to continue small oral tasters for comfort and to avoid potential oral aversion syndrome. She was transferred back to the local hospital to complete a course of intravenous antibiotics. The patient had on-going dietician input and has been discharged from hospital. Follow-up with tertiary paediatric services is on-going to manage the evolving malacia, and once stabilised, a gastric interposition will be performed.

DISCUSSION

Ingestion of a button battery can present with a variety of symptoms and when no clear history of ingestion can be given from the patient or parents the diagnosis can often be delayed.⁸ The case discussed highlights the importance of a plain chest radiograph as an effective diagnostic tool to confirm or rule out button battery ingestion within the oesophagus. The use of the *halo* sign and *step-off* sign on a chest radiograph can also be used to differentiate a button battery from a coin, which is an important distinction as it can change the management of the patient.⁹

Most complications relating to button battery ingestion develop when they become lodged within the oesophagus. There are two factors that are known to increase this risk. First, batteries with a diameter of 20 mm or larger are known to cause more complications.⁵ Second, younger children are more at risk of major complications.⁵ Taking these factors into consideration, this patient would have been at an increased risk of a severe complication. This emphasises again the importance of early diagnosis and removal of a button battery to reduce the chance of a devastating complication such as a tracheoesophageal fistula.

In this case, the patient had to undergo multiple major surgical procedures with significant morbidity to treat the complications that had developed. However, usually if an early diagnosis is made, and the button battery is still in the oesophagus, urgent oesophagoscopy would be indicated to remove the battery. Following this, if no obvious complications were visualised during oesophagoscopy, management would often include post-operative barium swallow to exclude any leak and recommencement of oral intake. Other controversial management options include a period of observation, with some suggesting that if the duration of ingestion is short, the battery is <20 mm and the patient is older than 5 years and asymptomatic, the likelihood of oesophageal complications are low.¹⁰

Learning points

- ▶ To emphasise button battery ingestion as a differential diagnosis when a child presents with an unclear history of persist respiratory or gastrointestinal symptoms.
- ▶ Importance of a plain chest radiograph as an effective diagnostic tool for button battery ingestion.
- ▶ Importance of early recognition and treatment to minimise the change of devastating complications.

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