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CASE REPORT

Button Battery Ingestion with different outcome : two case reports from a Tertiary care Hospital

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Abstract:

Button battery ingestion is a distinct type of foreign body ingestion in children because of their potential to cause major injury or life threatening consequences. According to National Poison Data System, United States of America, there is a 6.7 fold increase in the percentage of button battery ingestion with major or fatal outcomes from 1985-2009. We are reporting two cases with history of accidental ingestion of button battery with different outcome.

Keywords: Button battery ingestion, Infant, Tracheo-esophageal fistula

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Introduction

Disc batteries are formed by compacting metals and metal oxides on either side of an electrolyte-soaked separator [1]. These batteries contain mercury, silver, zinc, manganese, cadmium, lithium, sulfur oxide, copper, brass, or steel. Battery generated current can produce sodium hydroxide which in turn may cause liquefactive necrosis [2]. Severe esophageal burns leading to subsequent perforations usually occur adjacent to the negative battery pole (anode) [1]. Injury can continue even after endoscopic battery removal for days to weeks due to residual alkali or weakened tissues.

Case 1:

A 3 month old male, normally growing baby was admitted at a Medical College Hospital with

sudden onset of refusal to suck on breast, excessive crying & drooling of saliva. The baby was born to nonconsanguinous parents by normal vaginal delivery and perinatal history was uneventful. According to his mother, the baby was kept under supervision of his 7 years cousin and they were playing with toys. There was no history of aspiration of milk or other objects and nothing was fed except breast milk. On examination, there was no abdominal distension, cyanosis and other sign of respiratory distress except tachypnea. Immediate chest X-ray including cervical region was done. It revealed impacted button shaped foreign body in the esophagus at the C5-6 level (Figure 1). Ingested foreign body was removed with Esophagoscopy about 36 hours after ingestion and the removed



**Figure 1: Chest X ray (Anterior-Posterior view)
Button battery lodged at C5-6 level**

material found to be a button battery measuring 20 mm. The patient was treated with intravenous fluid, intravenous antibiotics. After 4-5 days, baby had severe respiratory distress and hyperextension of neck. Baby was referred to our Pediatric Intensive Care Unit and treatment continued with mechanical ventilation and supportive managements. Bronchoscopy was done & revealed a large tracheo –esophageal fistula at the second thoracic brateva. Thoracotomy was done by Cardio-Thoracic and Vascular Surgery Department that revealed extensive liquefactive necrosis of the esophageal wall from pharyngoesophageal junction and a gap of 2.5cm at posterior tracheal wall. Repair of tracheal opening done and with esophagostomy and feeding jejunostomy. He was put on mechanical ventilation. He developed acute respiratory distress syndrome (ARDS) and managed according to ARDS guideline. He died on 5th post operative day due to severe ARDS leading to pulmonary hemorrhage.

Case 2:

A 2 years 3 month boy admitted at our department with the history of ingestion of button battery curiously while playing with toys. He had only history of one episode vomiting with no difficulty to drink. He had no cough or respiratory distress. He was asked what he had drunk or eaten. He informed his aunty generously that he had eaten the battery of his toy. Chest X ray revealed button battery lodged at the lower end of esophagus. Battery was removed with endoscopy within 10 hours of ingestion of battery. There was no perforation of esophagus on endoscopic view except mild area of redness at contact site of the battery. On follow up he had no difficulty on eating of solid foods or drinking.

Discussion

Disc batteries are small, coin-shaped batteries used in remote controlled devices, watches, calculators, hearing aids & toys. The vast majority of disc battery ingestions occur when curious children explore their environment. In one large study the age range of the patients was 22 days to 9 years [3]. Fatal outcomes occurred in children aged 11 months to 3 years [3]. Fatal cases or those with major sequelae usually involve esophageal or airway battery lodgement. When lodged within esophagus, ingested button batteries have strong potential for corrosive injury to the esophagus with major complications, including esophageal burns, fistula, or perforation. The proposed mechanisms of battery induced injury are, a) generation of an external electrolytic current that hydrolyzes tissue fluids and produce hydroxide at the batteries negative pole, b) leakage of the content of battery specifically the alkaline electrolyte, and c) physical pressure on adjacent tissue. Batteries with 3 Volt produce more sodium hydroxide and more liquefactive necrosis than 1.5 Volt batteries. Even a spent cell has residual voltage which may generate current locally and damage the tissue [1].

Batteries in the esophagus should be removed urgently in order to prevent fatal complication. Lithium containing batteries are associated with

much more clinically significant outcome than batteries containing other materials. Esophageal damage can occur in a relatively shorter period of time (2-2.5 hour) when a lithium disc battery is lodged in the esophagus [4]. On the other hand; those in the stomach can be watched for 2 days provided that the patient is asymptomatic. Continued presence in the stomach or the development of symptoms mandates urgent endoscopic removal. Once beyond the 2nd part of the duodenum batteries will pass the gastrointestinal system within 3 days [5]. Our first case was brought to medical attention too late and 36 hours had elapsed before the foreign body was removed endoscopically to predict a massive injury. But endoscopic removal of the battery was possible within ten hours of ingestion in our second case.

Disc batteries vary in diameter between 7.9-23 mm and in weight from 1 to 10 grams. The larger the diameter of the battery, more the chance of being lodged within esophagus or airway, as happened in our both case with battery measuring 20 mm in diameter. The two most important determining factors for esophageal lodgement of the battery are the young age and the diameter of the battery. There are case reports of spontaneous closure of tracheo-esophageal fistula secondary to button battery ingestion [6]. But our first case was symptomatic and massive fistula along three tracheal rings which may be due to prolonged (36 hours) contact period with the battery. Repair of trachea-esophagus fistula was performed after 4 weeks of battery ingestion when baby was symptomatic and unable to be managed with medical treatment.

Such an unusual scenario of button battery ingestion in a 3 month old baby has never been reported. The study of 8648 cases detected only 6 cases less than 1 year [1]. The incidence of accidental ingestion in such a young child is not quite easily explainable and that is probably the reason why it was not suspected initially. The clinical features of excessive drooling, inability to feed were highly nonspecific and delayed the diagnosis. The age old dictum of suspecting foreign body in a suddenly symptomatic child and

prompt x-ray could have prevented the complication and saved the life in this case. On the contrary, the child as our second reported case informed parents himself regarding battery ingestion which helped for earlier endoscopic removal of the battery and a better outcome.

Conclusion:

Children are curious by nature. Manufacturing company should install the button battery in such a secured manner in every toy, so that the curiosity of the children could not discover the battery and the statutory warning written in the toys must be strictly followed by the parents to avoid fatal outcome.

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