

# Button battery ingestion: A therapeutic dilemma and clinical issues in management

Jashanjot Singh Bhangu,  
Sukhminder Jit Singh Bajwa<sup>1</sup>,  
Smriti Anand<sup>2</sup>, Kanwalpreet Kalsi<sup>3</sup>  
*Department of Radiodiagnosis,  
<sup>1</sup>Department of Anaesthesiology  
and Intensive Care, Adesh Hospital,  
Kurushetra, Haryana, <sup>2</sup>Department of  
Anaesthesiology and Intensive Care,  
Mullana Medical College, Solan, Himachal  
Pradesh, <sup>3</sup>Department of Medical Health  
Services, Patiala, Punjab, India*

**Address for correspondence:**  
Dr. Sukhminder Jit Singh Bajwa,  
House No. 27-A, Ratan Nagar, Tripuri,  
Patiala - 147 001, Punjab, India.  
E-mail: sukhminder\_bajwa2001@  
yahoo.com

## Abstract

Button batteries, also known as disc batteries, are tiny, round batteries commonly present in numerous household electronic gadgets such as watches, calculators, cameras, hearing aids, penlights, remote control devices, and certain toys. Because of their easy accessibility to children, they pose a serious menace of accidental ingestion or inhalation. Most of the ingestions are benign. However, large-sized button batteries when ingested can become impacted in the esophagus or elsewhere in the gastrointestinal tract with life-threatening repercussions. We report a 4-year-old female child brought to our setup by her parents with an alleged history of ingestion of a button battery of the watch approximately about 2 h back. The child, apart from being anxious, was asymptomatic. An initial radiograph of the chest and abdomen was taken, which showed the battery at the distal end of the stomach. Considering the small size of the battery cell and after seeking the gastroenterologist's consultation, it was decided that the child would be managed conservatively with oral antacids and serial abdomen skiagrams were obtained. The button battery was eventually detected in the stools after 2 days.

**Key words:** Button battery, impaction, ingestion

## INTRODUCTION

Button batteries are ubiquitous, now being increasingly found in household electronic gadgets such as watches, calculators, hearing aids, penlights, remote control devices, and certain toys. Their smooth and shiny appearance coupled with their easy accessibility has inadvertently led to their frequent ingestion or inhalation by children.<sup>[1]</sup> A majority of the battery cell ingestions are benign, passing spontaneously through the gastrointestinal tract.<sup>[2]</sup> However, they can get lodged in the esophagus or elsewhere in the gastrointestinal tract where they can be fatal and life-threatening.<sup>[3,4]</sup> These button cells, apart from being ingested, can be inhaled by placing them in the nose or they can be placed in the ear as well.<sup>[1]</sup> In fact, button battery ingestion accounts for 2% of all the foreign

body ingestions.<sup>[5,6]</sup> Ingestion of large-sized button batteries ( $\geq 20$  mm) in children younger than 4 years is associated with increased morbidity and mortality.<sup>[7]</sup> While a small-sized button battery passes uneventfully through the gut within 2-6 days, sometimes taking up to 2-4 weeks,<sup>[8]</sup> large-sized button cells can get impacted in the gut, the most common site being the esophagus.<sup>[9]</sup> An impacted button cell can ulcerate, perforate, lead to fistula formation, or even death.<sup>[10]</sup>

## CASE REPORT

A 4-year-old female child was brought to our setup with an alleged history of ingestion of button cell battery of a watch  $6.8 \times 1.1$  mm in diameter (as mentioned in the other battery cell of the same watch) about 2 h back.

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On examination the child was conscious, cooperative, oriented but anxious. Her weight was 15 kg. Her heart rate was 110 beats per minute, blood pressure was 90/60 mmHg, and saturation by pulse oximeter was 98%. Her abdomen was soft, nondistended, and nontender. Bowel sounds were normal. Radiographs of the chest and abdomen were taken, which showed the button cell at the distal end of the stomach [Figure 1]. Gastroenterologist consultation was sought and considering the small size of the cell, its presence in the distal stomach, and asymptomatic presentation, the child was kept on conservative treatment. The child was admitted and kept on normal diet. Syrup ranitidine 2.5 mL (35 mg) once daily was started. Also, serial skiagrams of the abdomen were taken [Figures 2 and 3]. The stool was also examined for the cell. The child remained asymptomatic with stable vitals and the button cell was eventually detected in the stool after 2 days.

## DISCUSSION

Button battery ingestion poses a serious menace to children. The first reported case of button cell ingestion was in 1977 involving a child who had swallowed a camera battery, which had become impacted in the proximal esophagus.<sup>[11]</sup> Now because of its easy accessibility, there has been an alarming surge in the accidental ingestion, especially in the very young.

Button cell batteries are mainly of four types: Mercury, silver, lithium, and a strong hydroxide of sodium or potassium.<sup>[12]</sup> Lithium cells are commonly present in watches. Lithium cells though have a higher potential of 3 V as compared to 1.5 V seen in other cell types but being thin, they can easily pass through the gut if swallowed.<sup>[2]</sup> The mechanism of button battery injury includes generation of an external electrolytic current that hydrolyzes tissue fluids and generates hydroxide at the anode, leakage of battery contents and their absorption, low voltage burns, and pressure necrosis of the adjacent tissue.<sup>[8,13]</sup> Button cells can result in considerable morbidity and mortality once impacted in the esophagus or elsewhere in the gut within a few hours of its ingestion, thereby emphasizing the need of distinguishing it from other foreign body ingestions. Complications include esophageal burns and perforations, tracheoesophageal fistulas, mediastinitis, and aortic perforation.<sup>[4]</sup> Chest and abdominal skiagrams with appropriate exposure can prove to be very useful in these cases. Button cells give a characteristic double rim appearance in the anterior-posterior view and step-off appearance in the lateral view.<sup>[4]</sup>



**Figure 1:** Skiagram of day 1 showing button battery in the distal part of the stomach



**Figure 2:** Day 2 image showing movement of button battery to the large gut



**Figure 3:** Abdominal x-ray of day 3 showing no sign or image of button battery

In the present case, the child presented to us approximately 2 h after ingestion of the button cell of the watch. At the time of presentation, the child was anxious

but asymptomatic with stable vitals. The child had swallowed a single battery cell of the watch, which had a dimension of  $6.8 \times 1.1$  mm (as mentioned on the other battery cell of the same watch). Immediate skiagrams of the chest and abdomen were obtained, which showed the presence of the disc cell at the distal end of stomach. As the child was asymptomatic and the battery cell had already crossed the esophagus, it was decided that the child would be managed conservatively on a normal diet and syrup ranitidine was started. Though the child could be managed at home as well, since she belonged to a distant village it was decided that she would be admitted.

It has been found that virtually all the button cells that cross the lower esophageal sphincter will pass out without any hurdle, thereby negating the need for endoscopic retrieval.<sup>[2]</sup> Emesis should not be evoked at this time as there is a risk of the theoretical model of regurgitation and fatal airway obstruction.<sup>[2,14]</sup> The administration of oral antacids has been found to be useful as they decrease corrosion of the cell.<sup>[15]</sup> Small cells as in the present case, usually negotiate the pylorus without any need for endoscopic retrieval or surgical intervention. However, serial abdominal radiographs are required to confirm the passage. Rarely can a cell get impacted in the Meckel's diverticulum.<sup>[16]</sup> Endoscopy or surgical removal has a role to play only if the cell gets impacted in the esophagus, stomach, or elsewhere in the gut mucosa for prolonged periods or the signs of peritonitis set in.<sup>[17]</sup> Ingestion of multiple battery cells with  $\geq 20$  mm dimension by a child of less than 4 years age are associated with adverse outcomes.<sup>[7]</sup> Symptoms of button cell impaction in the decreasing order of frequency include vomiting or hematemesis, pain in the abdomen, discoloration of stool, fever, loose stool, rashes, respiratory distress, and nonspecific symptoms such as anorexia, dysphagia, and retrosternal discomfort.<sup>[18]</sup> As none of the above symptoms were present in the present case and the cell had passed the esophagus, a decision for conservative management was taken. The child was closely monitored for the above mentioned symptoms; serial skiagrams were taken and inspection of the stool was done. The battery cell was detected in the stool on the second day.

Our case report highlights that in cases where the battery cell has been ingested and found to be present in the stomach with the patient being asymptomatic, an overzealous treatment is not required. Rather it is safe to consider a conservative approach in management. However, a check on the impending signs and symptoms should be kept and definitive intervention carried out accordingly.

## CONCLUSION

Button battery cell ingestions have shown an alarming surge in the recent years among children because of their easy accessibility. Prompt medical attention is required in such cases. Though button cells lodged in the esophagus require urgent endoscopic intervention, those present in the stomach at the time of presentation should be managed conservatively in the asymptomatic child coupled with serial follow-up abdominal skiagrams and stool examination. The button cells are usually detected in the stool within 2-6 days.<sup>[8]</sup> Definitive management in the form of endoscopic retrieval or surgical intervention may be required in case of development of impending signs and symptoms. However, prevention is still the need of the hour. Parents should be educated about the potential hazards of the battery cell exposure, especially ingestion among children and the need to keep these away from their reach. Also, manufacturers should ensure secure packaging of these cells.

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## Conflicts of interest

There are no conflicts of interest.

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