



## Button Battery Ingestion in Children: About A Case of Fortuitous Discovery

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### Abstract

A 4 - year - old boy was admitted to the paediatric emergency department of Rouen University Hospital (France) for ingestion of a button battery. He was admitted for vomiting and fever. A chest X - ray performed suggested the diagnosis. Esophagastroduodenoscopy revealed grade 3A esophagitis according to the Zargar classification. The child was treated with Esomeprazole after endoscopic removal of the cell. Good healing of the oesophageal lesions was observed, with no stenosis at the 6th month follow - up. The urgent rigid endoscopy was successful. Long-term clinical and endoscopic monitoring is imperative.

**Keywords:** Foreign Body; Button Battery; Endoscopy; Child

### Introduction

An increase in the ingestion rates of button batteries has been observed in children [1-3]. This phenomenon is believed to be linked to the proliferation of home multimedia devices using larger sized batteries [1,2]. Oesogastroduodenal fibroscopy (OGDF) allows for the confirmation of the diagnosis of foreign body ingestion, as well as for its extraction. The consequences on the oesophagus are severe : corrosive lesions, coagulative necrosis, perforation, fistula, stenosis, and death [3-7]. The risk remains the same, even after the urgent endoscopic removal of the cell [8]. Some complications can be potentially fatal, such as perforation or fistula, especially in the case of oesophageal impaction [3,4,8]. Digestive foreign bodies in children are a common reason for consultation. The aim of this work was to report a clinical case of button battery ingestion in a 4-year-old boy, detailing its management in a context of endoscopic availability.

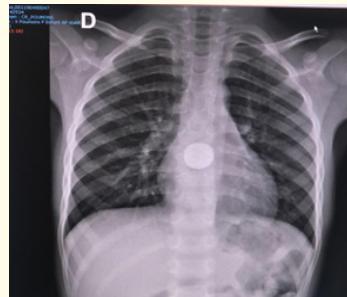
### Observation

A 4 - year - old boy, with no pathological history, was admitted to the paediatric emergency department of CHU Charles Nicolle in Rouen (France) for vomiting, fever, hypersalivation, and abdominal pain lasting for 48 hours. The parents did not have any information regarding any incident that might have occurred at home. There were no signs of dehydration, bowel obstruction, or signs of peritoneal irritation. A chest X - ray revealed a radio - opaque foreign body lodged in the mediastinal area. From the front (Figure 1), it presented as a round mediastinal opacity with a smooth double contour. In profile, a linear opacity indicated the posterior position of the foreign body relative to the clear airways of the larynx, trachea, and carina. This opacity was characteristic of a button cell lodged in the oesophagus. The diagnosis of accidental ingestion of a button battery was then considered. During the initial upper gastrointestinal endoscopy (two days after the onset of symptoms,

or day 0 of admission), an intra - oesophageal button battery was identified. The extraction was immediate. A grade 3A esophagitis (focal transmurally ulcerated mucosa) according to the Zargar endoscopic classification was evidenced in the lower half of the oesophagus (Figure 2 - A). The ablation was performed using a rigid H2 endoscope. A thoraco - abdominal magnetic resonance imaging additionally revealed peri - aortitis.

After the removal of the foreign body, the child was treated with Proton Pump Inhibitors (PPI), Esomeprazole 10 mg IV for 6 weeks. Parenteral nutrition, followed by enteral nutrition via nasogastric tube was administered. On the 7<sup>th</sup> day after the procedure,

the control endoscopy (figure 2 - B) showed persistence of mucosal ulceration at the lower oesophagus (small ulceration < 1 cm), with good healing of the ongoing esophagitis. On the 18<sup>th</sup> day, the healing of the esophagitis lesions was complete, with no stenosis (Figure 2 - C). The control endoscopies at 1 month and 3 months were normal. On the oesophageal gastro duodenal transit (OGDT) as well, there were no lesions or stenosis visualized. Clinical evolution was favourable after 6 months of monitoring. Resumption of feeding was normal, with the child consuming all foods without blockage or coughing during feeding. Weight gain was regular. The child's medical follow - up will continue pursued into adulthood in the paediatric gastroenterology, hepatology, and nutrition unit of the CHU Rouen.



**Figure 1:** Image of round mediastinal opacity on chest X-ray (frontal view), suggesting initially a radio - opaque foreign body embedded.



**Figure 2:** 2A. Endoscopic image of esophagitis with focal necrosis after ingestion of a button battery (D0).  
 2B. Endoscopic image after removal of the button battery and treatment with Proton Pump Inhibitors (D7).  
 2C. Image of healing of oesophageal lesions during esophago-gastro-duodenoscopy (D18).

## Discussion

Button batteries are the second most frequently ingested foreign object by children after coins, and the first among batteries [9]. Their accidental ingestion is an emerging cause of mortality among children worldwide. Such incidents are likely underreported among Chinese children [6]. The increasing miniaturization of electronic devices has accelerated the widespread use of button batteries in household appliances and children's toys [1]. As a re-

sult, the smooth and shiny appearance of button batteries makes them more attractive and accessible to young children. These household accidents are characteristic of early childhood, also seen with caustic products (median age of 29 months) [5,6,10]. The development of a certain degree of mobility and the oral exploration of the environment at the walking age further explain this phenomenon. Boys (58.7 - 84.6%) are overrepresented in the literature [4,5,10,11]. Clinically, vomiting, hypersalivation, fever, and feeding problems are well documented, with varying frequencies from one

author to another [8,10]. On the other hand, dysphagia, dysphonias, and recurrent respiratory infections indicate contiguous complications [4,5]. The clinical signs of button cell ingestion are therefore non - specific [2,5]. This misleading clinical picture causes a delay in consultation, especially in the absence of a witness to the ingestion, and potentially a delay in diagnosis at the hospital [10,12]. Given the experimental and clinical data showing that coagulative necrosis begins within 15 minutes of contact between the cell and the oesophagus, major corrosive lesions begin in the hours following ingestion (2 to 2.5 hours) [12]. Immediate endoscopic extraction is necessary at the risk of complications (ulcerations, digestive perforations) [13]. The importance of X - ray imaging of the thoracic examination was vital in this clinical case. It involved a round opacity with a double regular contour, characteristic of an image of an ingested button cell. The differential diagnosis is discussed with the ingestion of a coin, which also manifests as a round opacity, but with a single contour, and its extraction can be delayed in the absence of clinical signs [7,14]. In a Turkish study, the most frequent location of the ingested button cell was the proximal oesophagus (58.8%), followed by the middle oesophagus (17.6%) and the distal oesophagus (23.5%) [10]. Upper gastrointestinal endoscopy was only performed 48 hours after ingestion. The duration of exposure increases the severity of oesophageal lesions, leading to ulceration

and perforation of the mucosa [10]. Nevertheless, a late admission is not a certain indicator of a less favourable outcome, as severe lesions can also occur in cases of early admission. Rapid diagnosis [4,8]. Grade 3A of the Zargar endoscopic classification (Figure 3) corresponds to transmural mucosal ulceration with focal necrosis [15]. However, a grade 2A may require dilation, with the factor of duration of exposure in the oesophagus being crucial. The housing of lithium batteries is associated with a disproportionate number of adverse effects compared to the housing of other types of batteries, due to their larger size and the increased likelihood of impaction, as well as their ability to generate a higher current [3,12]. Healing occurred under treatment with PPI (Esomeprazole), which avoided a potential indication for gastrostomy. The complications can be dramatic, from simple mucosal lesions, oesophageal - tracheal or oesophageal - aortic fistulas, haemorrhages due to vascular involvement, perforations, oesophageal strictures, vocal cord paralysis, respiratory infections, pneumothorax, spondylodiscitis, and cardiorespiratory failure, death [3,8,13]. Endoscopy is also the essential tool for monitoring the evolution until adulthood. Follow - up of patients after the removal of a button cell is considered essential to assess medium - term complications, such as bleeding, and long - term sequelae, such as the formation of stenoses (41.0%), which must be promptly managed by endoscopic dilation [13].

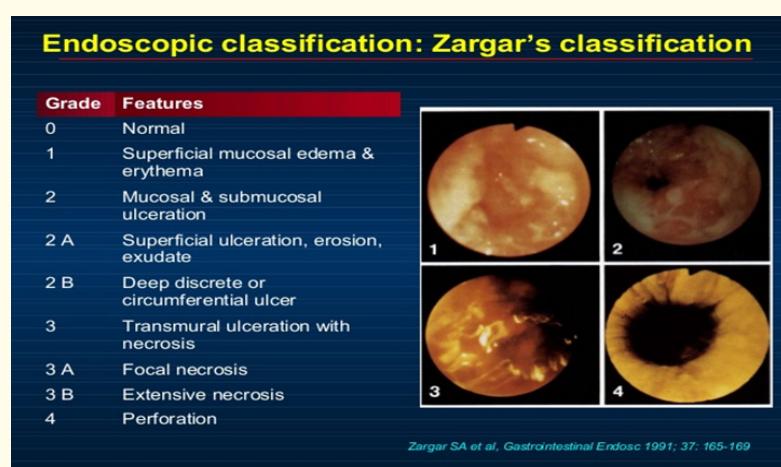


Figure 3: Endoscopic classification of Zargar [15].

## Conclusion

The accidental ingestion of button batteries is on the rise, particularly among young boys. Oesophageal injuries are significantly greater the longer the contact time is prolonged. The success of endoscopy for the urgent removal of any cell stuck in the oesophagus is commendable. However, there remains a possibility of stenosis, hence the need for medium and long term medical follow - up. Education and awareness for parents are crucial to reducing the incidence. The timely seeking of care, prompt diagnosis in emergencies, and the availability of digestive endoscopy will be lifesaving.

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