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FOREIGN BODY INGESTION IN CHILDREN - AN EMERGENCY CONDITION REQUIRING IMMEDIATE EVALUATION

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Abstract: Accidental foreign body ingestion is common in pediatric practice. Young children, especially those under five years, tend to put different kinds of small objects from their environment into their mouths. Sometimes due to the still immature reflexes, they are unintentionally swallowed. Most often these are coins, followed by magnets, button batteries, toys or jewelry, but also many others. Luckily, in most cases, these foreign bodies pass through the gastrointestinal tract without causing any symptoms or injuries. Some of them don't even get noticed or registered. However, it is estimated that in 10 to 20 percent of the cases there is a need for medical intervention.

A critical condition is lodgment in the esophagus because it requires extraction as soon as possible. Most often it occurs in its upper third. At this location the object is able to cause serious clinical discomfort, requiring rapid approach. Even dyspnea by compressing the trachea is possible. Injuries of the tissues, particularly after delayed diagnosis and treatment, might be a further dangerous consequence. Especially lodged button batteries cause critical damage of the esophageal wall in a very short time due to an electrolysis reaction on the site of the negative pole. This generates an alkali burn that might lead to life-threatening complications as perforation, fistulas to the trachea or to major blood vessels. Lethal outcomes are reported. Studies have demonstrated the development of significant injuries even only two hours of impaction. This emphasizes the importance of initiation of the extraction immediately.

Thus, in spite of the overall good prognosis clinicians have to be extremely alert when confronted with a child after foreign body ingestion. Immediate and profoundly evaluation is necessary in order to detect or exclude lodgment in esophagus- a condition requiring quick intervention. Especially when button batteries are involved time is crucial in order to prevent devastating complications.

Keywords: *children, foreign body, ingestion, button battery*
Field: Medical Science and Health

1. INTRODUCTION

The ingestion of foreign bodies in children has the potential of generating critical clinical symptoms and injuries. There are numerous reports of life- threatening conditions and devastating complications. This article aims to sensitize clinicians about the possible risks of this circumstance and to emphasize the importance of rapid evaluation, diagnostics and therapy if indicated.

2. REVIEW

Accidental foreign body ingestion is a common event in the pediatric practice, especially among children younger than 6 years (Manfredi et al., 2025). The most frequently ingested objects are coins (Kramer et al., 2015; Little et al., 2006; Panieri & Bass, 1995), followed by other items such as magnets, button batteries, but also toy parts, jewelry and food particles (Arana, Hauser, Hachimi-Idrissi, & Vandenplas, 2001; Little et al., 2006). It is estimated that 80-90% of the ingested foreign bodies pass uneventfully through the gastrointestinal tract (Gurevich, Sahn, & Weinstein, 2018). However, under certain circumstances, lodgment in the esophagus occurs representing a hazardous condition.

The esophagus has three anatomical constrictions- the upper one at cricopharyngeal level, middle at level of the thoracic aorta and the distal or diaphragm. In the majority of these cases the object can be identified in the upper third of the esophagus, where the narrowest part- the upper esophageal sphincter- is sited (Lin et al., 2007; Little et al., 2006; Russell et al., 2014; Shaffer et al., 2020; Shivakumar, Naik, Prashanth, Yogesh, & Hongal, 2004). At this location a foreign body usually causes clinical impairment, such as dysphagia, pain, swallowing difficulties, drooling and vomiting, that can lead to serious feeding and drinking problems (Lin et al., 2007; Panieri & Bass, 1995). Even a laryngotracheal compression is possible, resulting in respiratory distress and stridor (Kay & Wyllie, 2005). In these cases, immediate

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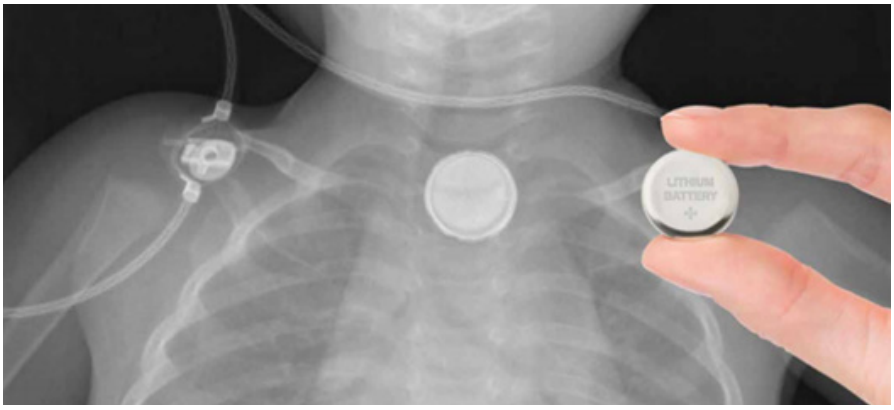
removal is required. However, even in an asymptomatic child, an esophageal lodged object should be extracted within 24 hours, as the risk of injuries to the esophageal wall and adjacent tissues, even when blunt objects ingested, increases with the length of the lodgment duration (Gurevich et al., 2018; Tringali et al., 2017).

In spite of a lower incidence compared to coins, the ingestion of button batteries is a particularly dangerous emergency, especially when larger 20-mm, higher voltage 3V Lithium coin cells are involved, as they are more likely to get lodged in the esophagus and cause severe damage (Jatana et al., 2013; Shaffer et al., 2020). The contact with the mucosa generates an electrical current, resulting in electrolysis reaction with release of hydroxide radicals at the site of the negative pol of the battery and thus causing a severe alkaline caustic injury to the esophageal wall (Völker et al., 2017). Serious tissue injury can be observed in only 2 hours of exposure (Litovitz, Whitaker, & Clark, 2010; Manfredi et al., 2025; Sutherland & Bowen, 2023; Völker et al., 2017) and may potentially progress into critical complications as esophageal perforation, strictures, tracheoesophageal fistulas and vocal cord paralysis (Shaffer et al., 2020) (Duan et al., 2020) (Leinwand, Brumbaugh, & Kramer, 2016) (Krom et al., 2018; Philteos et al., 2022). Another devastating consequence reported is fistulation into major blood vessels as aorta, subclavian artery and thyroid artery, leading usually to a fatal outcome due to exsanguination (Akinkugbe et al., 2022; Leinwand et al., 2016; Pae, Habte, McCloskey, & Schwartz, 2012; Ventura et al., 2017). Retrospective data from the US demonstrated an alarming trend of increasing morbidity and mortality, followed by button battery ingestions in the past 30 years, especially among children younger than 4 years, which paralleled the expanding use in households of larger, higher voltage lithium batteries (Litovitz, Whitaker, Clark, White, & Marsolek, 2010; Sharpe, Rochette, & Smith, 2012). The extent of the tissue damage is mainly dependent on the length of the contact time (Hoagland, Ing, Jatana, Jacobs, & Chatterjee, 2020), so the crucial role of immediate extraction has been clearly emphasized in the literature (Litovitz, Whitaker, Clark, et al., 2010). Considering this, national and international guidelines recommend an emergent (<2 hours) removal of all esophageal impacted button batteries (Eich C, 2016; Guideline, 2018; Kramer et al., 2015; Tringali et al., 2017).

Fig. 1 X- Ray image of neck and thorax of a child. A button battery lodged in esophagus with characteristical double ring or halo sign



Source: https://kidsafesa.com.au

Performing an X-ray image of neck, chest and abdomen is a standard procedure for diagnosis and location of radio-opaque foreign bodies. Furthermore, it might enable distinguishing between coin and button battery. Identification of a double ring at the edge or halo sign is characteristic for a button battery. Flexible or rigid endoscopy is another procedure not only for diagnostic purpose, but also for extraction. Moreover, it enables assessing the extent of damage of the esophageal wall and exploration for further complications as perforations for example. In case of severe damages, long impaction time or persisting symptoms a CT or MR scan might be sensible in order to detect injuries beyond esophageal wall (Mubarak et al., 2021). As alternative therapeutic tool for the extraction from the upper esophagus the use of Magill forceps and (video-)laryngoscope for visualization might be considered (Eich C, 2016).

Another important issue in the case of esophageal impacted button batteries are the strategies for mitigation of the injury prior extraction. Honey is considered to be protective due to coating of the battery and thus limiting the electrolysis reaction. However, it is contraindicated in children under 12 months of age because of botulism risk. Another substance is sucralfate, a weak acid, that is supposed to neutralize the hydroxide in tissue und thus limit the injury severity. The proposed dose of The European

Society for Pediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) are 2 teaspoons every 10 minutes up to 6 times for honey and up to 3 times for sucralfate. Clinicians should be aware of these strategies that might improve outcome, however they do not justify delay of extraction procedure. Another essential contraindication for both substances is impaction time of more than 12 hours, as perforation of the esophageal wall might have already occurred (Mubarak et al., 2021; Sethia et al., 2021).

3. CONCLUSION

In spite of its overall good prognosis, foreign body ingestion in children is an emergency condition requiring an immediate and profound evaluation, in order to recognize the patients requiring urgent therapy. Lodgment of an object in the esophagus is a critical situation. It may cause serious clinical impairment and significant tissue damage. Especially button batteries have a great potential to generate devastating injuries in a short time leading to life threatening complications or even a fatal outcome. Thus, clinicians involved in pediatric care should be alert about the risk that ingested objects represent and be familiar with their management.

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