



Review article

Battery ingestion in children

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ABSTRACT

Introduction: Ingestion of batteries by children became more frequent in recent years, due to the increasing accessibility of electronic toys and devices to children. Due to their electrochemical composition, impacted batteries in the esophagus may cause an extensive damage. Following the removal of a battery, the post-esophagoscopy management is still controversial.

Case presentation: An otherwise healthy 8 year-old boy presented to the pediatric emergency room 3 h after the unintentional swallowing of a lithium battery. On examination, the patient was diaphoretic and tachypneic. Plain PA chest film revealed a 2.5 cm diameter radiopaque round object in the upper esophagus. The patient was scheduled for an urgent rigid esophagoscopy which was performed 2 h after admission. Esophagoscopy findings included an impacted lithium battery in an advanced emptying process at a level of 17 cm from the incisor teeth, with a 3rd degree ulcerative esophagitis. It was not possible to visualize either the distal esophagus or the stomach. A nasogastric tube was not inserted because of a significant risk for esophageal perforation if bluntly passed. Post-operative medical therapy included fasting, administration of intravenous antibiotic therapy, antacids, and steroids. Flexible esophagoscopy superior to the level of the mucosal injury performed one day later, revealed erosive esophagitis, without evidence of perforation. Upper digestive tract gastrografin swallow test performed 2 days after esophagoscopy did not demonstrate a leak from the esophagus, and oral feeding was carefully re-initiated. Treatment was discontinued the following day. Follow up on days 10 and 14 revealed a healthy child with normal swallowing.

Discussion: Battery ingestion-related injury results from direct pressure necrosis, local electrical currents and alkali leakage. Signs and symptoms of ingested battery are related to impaction duration, size of battery, battery content and peristaltic waves of the esophagus. Appropriate imaging studies should be performed to maximize identification of the foreign body before esophagoscopy. Esophageal stenting and adjuvant medical therapy (steroid therapy, antibiotic therapy and anti-reflux therapy) have a low evidence level of clinical benefit following caustic injuries from impacted batteries and spillage of their content to the esophagus. A judicious management should be tailored in each patient. Increased public and health personnel awareness is necessary to diminish the incidence of battery ingestion.

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1. Introduction

Foreign body ingestion in children is a common problem encountered and treated by both pediatricians and otolaryngologists. While coins are still the most common foreign bodies swallowed in children, ingestion of batteries became more frequent in recent years among children, due to the increasing accessibility to electronic toys and devices by children [1]. Generally, batteries pass easily through the upper gastrointestinal tract and are eliminated in the stools in a few days. However, especially in little children, batteries with a 20 mm or larger diameter can be impacted in the esophagus and cause local damage.

Swallowing of batteries poses a more dangerous and serious challenge than swallowing of coins or other inert objects, due to their electrochemical composition and large potential for local damage. The dissolving of batteries active ingredients within the upper aerodigestive tract is associated with a strong exothermal reaction within the tissue, causing severe mucosal injuries which resemble skin burn.

Exceptionally rare complications include esophageal or aortic perforation [2], tracheo-esophageal fistula [3–10], tracheo-esophageal fistula with a fatal hemorrhagic shock due to erosion of the inferior thyroid vessels [11], severe esophageal bleeding [12], bilateral vocal cord paralysis [13] and heavy metal (lithium, mercury) intoxication [14,15].

The main therapeutic procedure is the removal of the battery via rigid esophagoscopy. Post-operative treatment options such as anti-reflux therapy, antibiotic therapy, steroids and esophageal stenting are still controversial. The purpose of this article is to review the current knowledge on this injury pathophysiology of injury and to discuss treatment choices and controversies. The following case report is descriptive. This work has been approved by the local IRB.

2. Case report

An otherwise healthy 8 year-old boy presented to the pediatric emergency room 3 h following an unintentional swallowing of a lithium battery. On examination, patient was diaphoretic and tachypneic. Plain PA chest film revealed a 2.5 cm diameter radiopaque round object in the upper esophagus (Fig. 1). The patient was scheduled for an urgent rigid esophagoscopy which was performed 2 h after admission. Esophagoscopy findings were an impacted lithium battery in an advanced emptying process at a level of 17 cm from the incisor teeth, with a 3rd degree ulcerative esophagitis (Fig. 2). It was not possible to visualize neither the distal esophagus nor the stomach. Nasogastric tube was not inserted, because of a significant risk for esophageal perforation if bluntly passed. Post-operative medical therapy included fasting, administration of intravenous antibiotic therapy (amoxicillin/clavulanic acid), antacids (ranitidine) and steroids (dexamethasone). Flexible esophagoscopy superior to the level of the mucosal injury performed one day later, revealed erosive esophagitis,

without evidence of perforation (Fig. 3). Upper digestive tract gastrografin swallow test performed 2 days after esophagoscopy did not demonstrate a leak from the esophagus, and oral feeding was carefully re-initiated (Fig. 4). Treatment was discontinued following an additional day. Follow up on days 10 and 14 revealed a healthy child with normal swallowing.

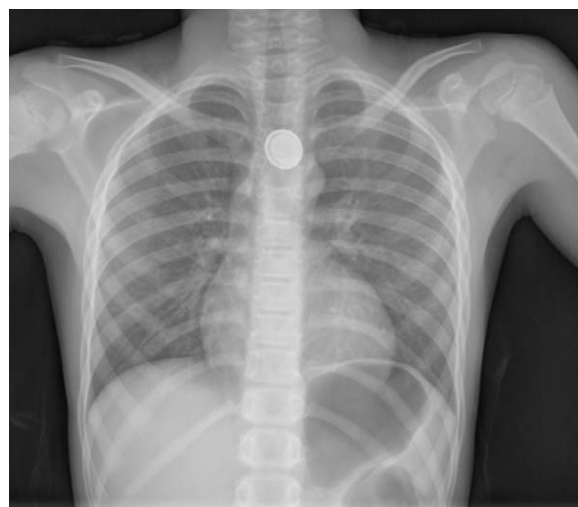


Fig. 1. Plain AP chest film showing a round radiopaque object in the upper mediastinum, consistent with a round battery or a coin.



Fig. 2. Lithium battery seen after its removal upon gross pathology. Note corrosive changes.

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