



Case report

Secondary esophageal perforation rupture of ascending aorta 16 day accidentally-swallowing button battery in a young child: A case report of esophageal foreign body and mini review

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ARTICLE INFO

Keywords:

Button battery
Esophageal foreign body
Aortic rupture
Shock
Case report

ABSTRACT

Introduction and importance: Foreign body ingestions often occur in children between the ages of six months and three years. Swallowing button battery can cause serious complications such as gastrointestinal mucosa tissue necrosis and esophageal perforation. Fatal secondary lesions after foreign body removal are rarely reported.

Case presentation: We reported a case of 18 months old boy who accidentally swallowed a button battery (20 mm diameter, 3.2 mm height) which lodged in the esophagus for 3 days before removed by esophagoscope. Secondary esophageal perforation and rupture of ascending aorta resulted in death 13 days after the battery was removed. The autopsy confirmed the rupture and tissue necrosis of the esophagus and ascending aorta.

Clinical discussion: The button battery incarcerated in the second stricture of the esophagus can cause serious complications and death even after removal due to battery-induced tissue erosion. Great attention should be closely paid to early endoscopic reinspection postoperatively and take comprehensive treatment to avoid similar death.

Conclusion: When the incarceration of button batter occurs in the second stricture of esophagus, the possibility of esophageal perforation and the rupture of main artery should be considered. The comprehensive treatment after operation is as important as taking out the foreign bodies.

1. Introduction

Because of the round appearance and the shiny shell of the button battery, it is very attractive to children, and mistaken swallowing occurs often. Swallowing the battery will bring mechanical damage and corrosive damage to the digestive tract or respiratory tract. In this case, 3 days after swallowing the button battery then removed by esophagoscope, the child died of secondary esophageal perforation 13 days later. Autopsy confirmed the rupture of the ascending aorta and massive hemorrhage, which had not been reported in the world. This case deserves our social reflection. Although the button battery was taken out after being swallowed by mistake, due to the lack of clinical experience in its treatment, the severity of the later complications was not fully estimated, leading to the failure to prevent the death of the child. Through this report a recurrence of the similar cases was expected to be avoided [1–3]. This case report has been reported in line with the SCARE

Criteria [4].

2. Case report

Dec 04, 2018 A young boy of 18 months old was admitted to emergency department due to 3 days of fever and dysphagia with no relevant personal nor familial medical history, under no medication. Chest radiograph shows (Fig. 1): one button battery is embedded below the esophagus entrance. Esophagoscopy was performed through the mouth by emergency surgeon. Endoscopic observation: esophageal mucosal edema around one button battery, eschar coverage. One lithium button battery (20 mm diameter, 3.2 mm height) was taken out completely. After the operation, the patients were treated with anti-infection, gastric acid inhibition, fluid supplementation and gastric tube feeding. Postoperatively, patient was recovered well. Reinspection chest computerized tomography (CT) scan (Fig. 2), blood routine and blood

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<https://doi.org/10.1016/j.ijscr.2022.107148>

Received 10 April 2022; Received in revised form 30 April 2022; Accepted 30 April 2022

Available online 4 May 2022

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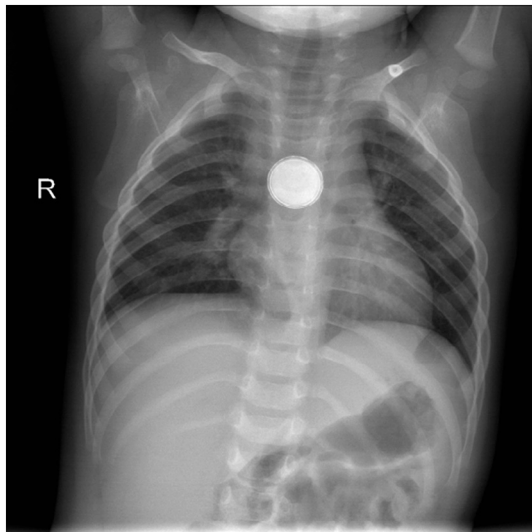


Fig. 1. One incarcerated button battery below the esophageal inlet.

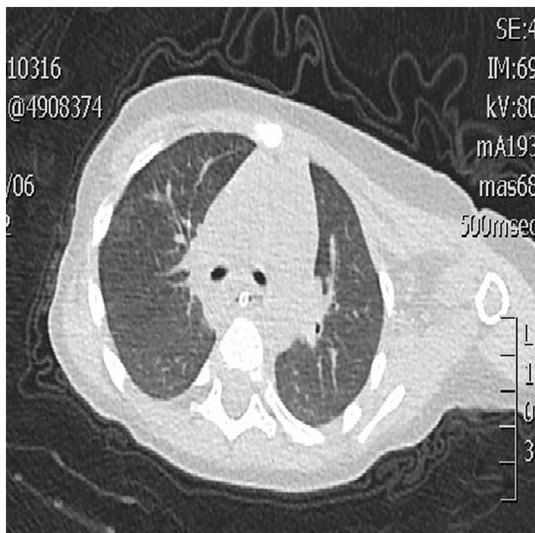


Fig. 2. Localized dilation of the upper esophagus.

biochemistry are normal. After 10 days of observation, the patient's condition was stable and was discharged from hospital. On December 17, the child suddenly vomited blood at home and returned to hospital immediately. The diagnosis of gastrointestinal hemorrhagic shock was considered after admission, immediately, implement blood transfusion, fluid rehydration and other anti-shock treatment measures. In the course of hospitalization, the child suddenly vomited blood again and died after rescue. On Dec. 19, 2018, an autopsy permitted by the parents of the deceased was carried out. It was determined that the severe corrosion made by the trapped button battery caused full-thickness esophageal defects, and aortic rupture and bleeding resulting in acute respiratory and circulatory failure due to hemorrhage and multi-organic hypoxia ischemia, and eventually caused death (Figs. 3–6).

3. Discussion

Different from other common foreign bodies in digestive tract, button batteries have complicated injury mechanism. After incarceration, it directly produces mechanical compression; its stay in the esophagus will also cause electrical damage because the mucous of digestive tract is a moist environment and local electric short-circuit is easy to form after

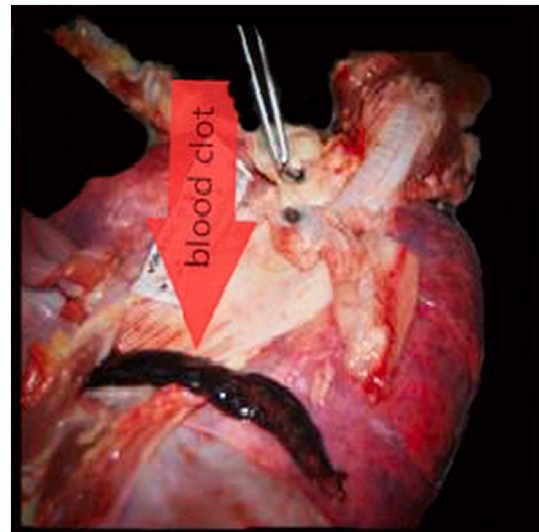


Fig. 3. Full-thickness defect of esophagus with aortic rupture, hemorrhage, dark red blood clot 6.0 cm from pharynx, extending into the stomach. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)



Fig. 4. Full-thickness defect of esophagus with aortic rupture.

the children eat and drink; it leads to corrosion because the zinc oxide and silver ions on its surface react with the protein on the surface of the mucosa of esophageal; and the electrolyte and heavy metal ions exuded after damage of surface are more corrosive. The corrosion does not stop immediately Even if the battery is removed, it will continue to develop and result in mucosal erosion, ulceration, and even perforation in severe cases. In this case, the child was hospitalized without abnormality for 10 days after the button battery removed, while esophageal perforation occurred after discharge, which is precisely the mechanism of injury caused by the above [2,5].

There are three anatomic constrictions in the esophagus tract. • Pharyngoesophageal constriction: The first is at the junction with the pharynx (pharyngoesophageal junction) • Thoracic (aortobronchial) constriction: The second is at the crossing with the aortic arch and the left main bronchus. • Diaphragmatic constriction: The third is at the junction with the stomach [6,7].

It has been reported that the most common foreign bodies in digestive tract occurs in the three stenosis of the esophagus. The first stenosis

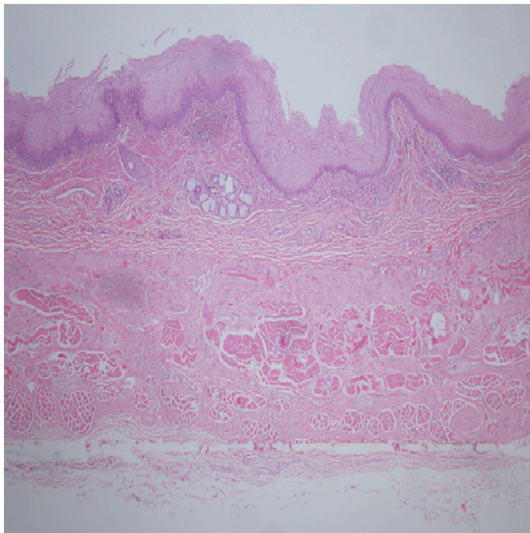


Fig. 5. Pathological section showing perforated esophageal tissue.

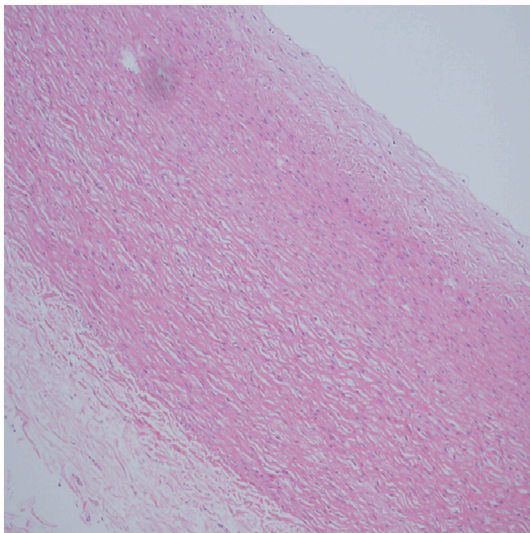


Fig. 6. Pathological section showing perforated vascular tissue.

is located at the Initial part of the esophagus, which is equivalent to the cricoid cartilage and the lower margin of the sixth cervical vertebra. The second stenosis of the esophagus is located at the position where the left main bronchus crosses the esophagus, which is equivalent to the sternal angle and the level of the 4th and 6th thoracic vertebrae with the aortic arch passing through from the left side. In this case, the button battery was just located in the second stenosis of esophagus. The imaging examination and the final results of autopsy showed that it was consistent with the perforation of esophagus and the rupture hemorrhage of aortic arch. Anatomically, more than 95% of cases occur at the first stenosis, but the prognosis is relatively good. Although it is rare to occur at the second stenosis, it often results in fatal complications [8,9].

After taking out the button battery which swallowed by mistake, the comprehensive treatment measures are very critical. It is suggested that the nasogastric tube should be placed for enteral nutrition, which can meet the nutritional needs of children and is beneficial to the recovery of mucous membrane. To maintain the nasogastric tube for enteral nutrition is the key to the postoperative comprehensive treatment, and the time should be strictly controlled. In this case, the child was hospitalized for 10 days after removing the foreign bodies in esophageal. The postoperative treatment included fasting, nutritional support and anti-

inflammatory treatment. No obvious discomfort was found during hospitalization. Reinspection of chest CT didn't find abnormal. The disadvantage of this case was that the child was allowed to leave the hospital without reexamination of esophagoscopy [10,11].

4. Conclusion

This case suggests that when the incarceration of button batter occurs in the second stricture of esophagus, the possibility of esophageal perforation and the rupture of main artery should be considered at the first time. Secondly, after children swallow the button battery by mistake, it emphasizes that the comprehensive treatment after operation is as important as taking out the foreign bodies. A strict standard of cure should be established, which includes the removal of foreign bodies, no uncomfortable symptoms and ability of eating soft food on own, no complications or complications have been cured, no leakage of contrast agent in esophageal iodine water radiography, and gastroesophageal endoscopy reexamination in the early stage.

Funding

No sources of funding to our research has been needed.

Ethical approval

It's a one case report needing no ethnical approval.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Registration of research studies

Not applicable.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Guarantor

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CRedit authorship contribution statement

Ye Peng: 807346006@qq.com (Deputy chief surgeon): Have written the article, Have consulted the family member, prepared the patient for surgery and participated in the surgery.

Hu Zhongmei: 283075431@qq.com (Attending doctor): have helped writing the article, confirm the histological diagnosis.

Zhang Jiangtao: 421668408@qq.com (Associate professor): have performed the autopsy and definite cause of this tragedy.

Yang yulan: 136327697@qq.com (Emergency resident): have participated in the patient management.

Yu Anyong: 1139179189@qq.com (Corresponding author): have supervised the writing of the paper.

Declaration of competing interest

No conflict of interest.

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