

## Case Report

# Disc battery in the pediatric oesophagus

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**Received:** 08 May 2020

**Accepted:** 01 June 2020

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### ABSTRACT

The wide usage of disc batteries in toys, in the late seventies presented a new problem. In the form of accidental lodgements in the pediatric aerodigestive tract. The physico-chemical nature of the disc battery necessitates an early removal, so as to avoid a fatal outcome if missed and retained for a long duration. Management of one such case is reported with radiographic documentation.

**Keywords:** Disc battery, Rigid oesophagoscopy, Squeeze toys

## INTRODUCTION

There are available a variety of toys in the Indian market which produce different types of sounds, that catch the attention of the child. Especially with the availability of made in China, toys, almost every child can boast of owning one. These toys are powered by single or multiple disc type batteries or by pencil cells.

The disc batteries, are removed from the compartment at the base of the toy and the child inserts them in his mouth. The battery may pass through the gastrointestinal tract and through the stools, but sometimes it may get impacted at the natural constrictions with consequent complications. Smooth foreign bodies more than 2.5 cm in diameter and 5 cms in length are less likely to less likely to traverse the adult gut without impaction and necessitate intervention.<sup>1</sup>

In 1896 Killan removed the first foreign body and in 1930 Chevalier Jackson gave the rigid endoscopes with good illumination. A case of oesophageal lodgement with excellent radiographic documentation and its management is being reported.

## CASE REPORT

A 6 year old boy was admitted in the casualty of the Otorhinolaryngology services, Dayanand Medical College and hospital, Ludhiana with mild bleed per os. The parents gave a vague complaint of foreign body ingestion a fortnight back. The elder sibling gave a history of the child having put something in his mouth hurriedly thumping on the back and digital probing did not detect any thing.

A plain radiograph chest PA view (Figure 1) and lateral view (Figure 2) exhibited a disc shaped radio-opaque shadow at the level of the aortic arch. The child was taken up for rigid oesophagoscopy under general anaesthesia. A shining foreign body was noticed in the middle oesophagus. It was surrounded by granulation tissue which bled on touch. The foreign body was extracted with an alligator forceps and was identified by the parents as the disc battery of the "squeeze toy", which was missing for a fortnight. The battery casing and joints, were intact on naked eye examination and on meticulous inspection of the battery under magnification, bite marks and corrosion of the casing at the joints was noted. The

battery casing could not be prised out and a charge of 5 millivolts was recorded to be still present in the battery.



**Figure 1: Radiopaque shadow of the disc battery on the anteroposterior projection of the chest.**



**Figure 2: Radiopaque shadow of the disc battery on lateral projection of the chest.**

The charge was measured using Kusumeco make digital multimeter. Serial recordings of the pH of a known solution, in which battery was submerged, ruled out the likelihood of leakage of the alkali contents of the battery. 10 cc of distilled water was used and the recordings were done every 15 minutes for the next 5 hours. The Voteler et al, normal saline immersion method even could not detect any change in the pH. Bubbling and a rise in the battery temperature observed when a live battery is immersed in normal saline were conspicuous by their absence. The post operative period was uneventful, child

was kept overnight in the hospital under observation and was discharged the next day after getting a chest x ray.

## DISCUSSION

The pediatric age group is notorious for presenting with ingestion of foreign bodies to the pediatrician or the pediatric otorhinolaryngologist.<sup>2</sup> Lerche in a study of 104 patients with foreign body esophagus reported undetected foreign body for a period of 4 years. Prognosis of untreated foreign bodies in the esophagus appears catastrophic because of the likelihood of possible complications like cervical or mediastinal abscesses, mediastinitis, empyema, oesophago-tracheal fistula and septicemia, Cohen has emphasised endoscopic assessment within 24-36 hours, in all patients presenting with a positive history of foreign body ingestion even though clinical and radiological examination is negative.<sup>3-5</sup>

In the pediatric age group toys and coins outnumber all types of swallowed foreign bodies. Perforation is rarely noted in esophageal impaction in the child, unless it is missed for a long period.<sup>6</sup> Incidence of perforation in missed foreign bodies is 1 in 100 cases and 1 in 3000 after instrumentation.<sup>7</sup>

The otorhinolaryngologist, pediatric surgeon or the thoracic surgeon depending upon the medical center may be called upon to undertake rigid oesophagoscopy to remove the foreign bodies from the pediatric oesophagus with the introduction of fine atraumatic oesophagoscopes with excellent illumination systems and better training facilities the mortality has dropped below 0.2% during removal of esophageal foreign bodies.<sup>8</sup>

Children with disc batteries in the aero digestive tract may present to the Pediatric Otorhinolaryngologist with a history of recent insertion or impaction of long duration.

Impacted disc battery in the nose, Bronchus, and alimentary tract have been reported in the available medical literature.<sup>9-13</sup>

Disc batteries in an air tight metallic casing contain a mixture of Zinc Oxide, Mercuric Oxide, Cadmium Oxide or Lithium Oxide. The mercury disc battery additionally contains, 26oh lo 45o/o Sodium or Potassium hydroxide.

The disc battery impacted for a long duration may incite a local tissue reaction leading to oedema and foreign body granulation tissue formation, which may be the cause of bleed per os. Pressure necrosis may result in fistulous communications. The battery may even heat up if placed in a conducting media further aggravating the damage. Residual low voltage direct current may even fulgrate the tissues.<sup>14</sup> Sometimes leakage of the battery contents may occur due to absence of biologic sealing of the battery. Potassium hydroxide causes alkali burns while Mercuric oxide is corrosive.<sup>15</sup> Stricture formation maybe the late

sequel of retained foreign bodies, which necessitate dilatation.

Moreover Mercury that leaks out of the battery may be absorbed by the tissues leading to systemic mercury poisoning. Regular urine levels of mercury are monitored in cases of toxicity. D-penicillamine can be used for oralchelation, in these cases.<sup>16</sup>

The bleed per os in this patient was probably due to the granulation tissue surrounding the battery. Absence of severe complications was probably due to a minimal residual charge in the disc battery as recorded by the multimeter and failure to raise the pH when tested by the Voltmeter method. In the Voltmeter test new batteries on immersion in saline raise the pH of the solution from 5 to 10. In dead batteries the pH shift is not noted. Indicating thereby that patient had swallowed a disc battery which was dead.

## CONCLUSION

History of disc battery ingestion, due to its physiochemical nature, in a child must be taken seriously. Radiographs of the neck and the chest AP and lateral projections should be the prerequisites in dealing with pediatric foreign bodies. Rigid diagnostic endoscopic assessment is to be undertaken under general anesthesia with full relaxation whenever there is a strong suspicion of a foreign body.

The sequel of impacted battery depends on the period of retention, area of contact, residual electric charge amount of chemicals leaking out of the battery.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: Not required*

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**Cite this article as:** Munjal M, Tuli N, Rishi P, Singh H, Munjal S. Disc battery in the pediatric oesophagus. Int J Contemp Pediatr 2020;7:1648-50.