

CASE REPORT

Oesophageal perforation after button battery ingestion

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Key words: Button battery; Oesophageal perforation

Button batteries are not infrequently swallowed by children and most cause no problems. A case in which the battery became impacted in the oesophagus, giving rise to major complications, is reported. Of 16 previously reported cases, two had a fatal outcome. Oesophageal 'hold up' of a button battery is potentially fatal and requires urgent treatment.

Case report

An 18-month-old girl presented with a 3-day history of complete dysphagia after swallowing a battery from her mother's hair drier. A chest radiograph showed a button battery lodged in the oesophagus (Fig. 1). At oesophagoscopy the battery was removed, apparently intact.

Radio-opaque material, presumed to be heavy metal, was seen on a postoperative chest radiograph (Fig. 2), but had disappeared by day 18. Renal function remained normal and mercury levels in blood and urine were never elevated.

A contrast swallow on day 5 showed leakage of contrast into a blind-ending pouch posterior to the oesophagus (Fig. 3). She was treated conservatively with ventilation and antibiotics, after which oral fluids were started on day 11.

At 7 weeks a tight fibrous stricture had formed, and at oesophagoscopy 1 week later it was obvious that resection would be required. After transthoracic resection of the stricture with primary anastomosis she required three oesophageal dilatations, but remains well 2 years later.

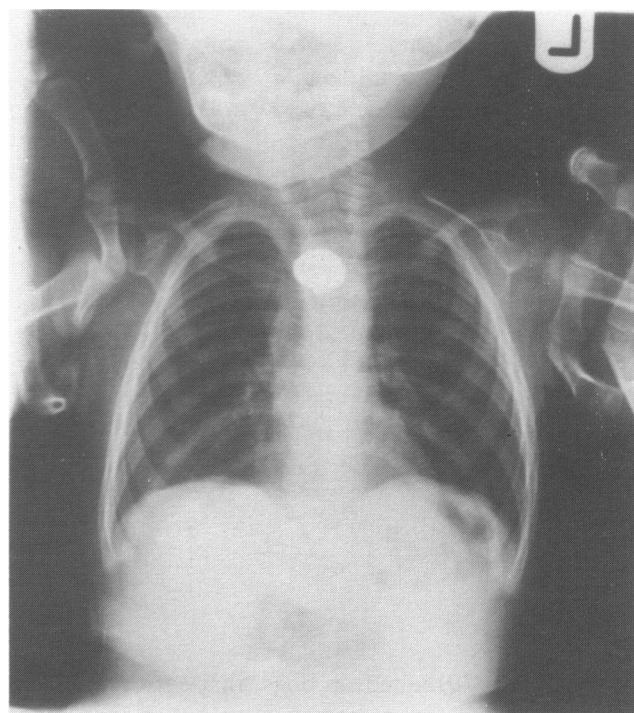


Figure 1. Radiograph on initial presentation showing the battery in the upper oesophagus.

Discussion

Button batteries are frequently swallowed by small children (1,2), and for batteries that are not held up in the oesophagus the indications for intervention are unclear (3-5). However, of the 14 previous reports of oesophageal impaction, 12 have resulted in major complications or death (Table I).

Significant damage may occur within a very short period of time after ingestion of the battery. Maves *et al.* (6) observed mucosal damage as early as 1 h after

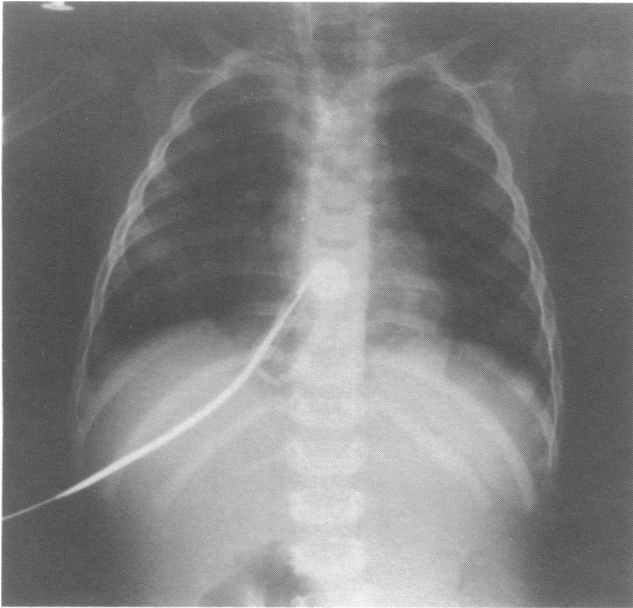


Figure 2. Radiograph after removal of the battery with radio-opaque material in the upper thoracic oesophagus.

oesophageal impaction of button batteries in cats, progressing to transmural necrosis within 4 h. Several mechanisms of tissue damage may be responsible—probably in combination.

Alkali

Button batteries are constructed of a zinc anode and a cathode made of either manganese, silver or mercuric oxide, separated by a disc containing a strong alkali (7), contained within a steel case. Strong alkali solutions induce rapid liquefaction necrosis of tissue (8), as is seen histologically in clinical and experimental reports (6). The battery cases are not biologically sealed and therefore leakage of alkali may occur in a fluid environment, such as the lumen of the oesophagus (9).

Electric charge

Litovitz *et al.* (10) noted, in dogs, that corrosion of the 'crimp' area of the battery case was seen only in cells that were charged at the time of ingestion—possibly facilitating alkali leakage. Yamashita *et al.* (11) also in dogs, observed oesophageal necrosis without evidence of electrolyte leakage after oesophageal placement of a charged battery.

Pressure

Nandi and Ong (1) thought that pressure necrosis was an important factor in 25 serious complications seen in their large series of oesophageal foreign bodies.

The risk of heavy metal poisoning seems to be slight (2,12), although at least one patient has been reported who developed renal failure (13). Litovitz (5) reported a series of 111 episodes of battery ingestion, which



Figure 3. Contrast swallow showing leakage of contrast from the oesophagus.

included only one case of oesophageal impaction. Even if the majority of cases are not reported because they result in no adverse effects, the documented cases still represent a significant and possibly avoidable source of morbidity and mortality.

It is, perhaps, worrying that in a recent survey of 312 British gastroenterologists, 36% said that they would not treat batteries sited in the oesophagus at all (13).

In view of the potentially disastrous outcome, all button batteries impacted in the oesophagus should be removed immediately. In several reported cases the major complication did not become apparent for 24–48 h after successful removal of the battery, indicating that a short period of observation is warranted even after apparently successful removal.

Table I. Previously reported cases of oesophageal impaction of button batteries

Reference	Age	History	Outcome
1 Blatnick <i>et al.</i> (14)	30 months	24 h	Tracheo-oesophageal fistula, (TOF) exsanguination, died
2 Shabino and Feinberg (15)	16 months	4 days	Aorto-oesophageal fistula, died
3 Janik <i>et al.</i> (16)	24 months	2 weeks	TOF
4 Votteler <i>et al.</i> (9)	25 months	5 days	TOF
5 Litovitz (7)	5 years	4 h	Oesophageal burns
6 Litovitz (7)	16 months	6 h	Oesophageal perforation
7 Maves <i>et al.</i> (6)	10 months	22 h	TOF
8 Litovitz (5)	11 months	22 h	TOF
9 Van Asperen <i>et al.</i> (17)	9 months	2 days	TOF
10 Kost and Shapiro (18)	18 months	29 days	Oesophageal stricture
11 Rivera and Maves (19)	3 years	48 h	Oesophageal perforation and stricture
12 Sigale and Lees (20)	4 months	30 h	TOF
13 Volle <i>et al.</i> (21)	16 months	48 h	No complication (endoscopy not performed)
14 Vaishnav and Spitz (22)	16 months	4 weeks	TOF

In this infant the necrosis occurred posteriorly in the oesophagus; anterior necrosis may lead to tracheal necrosis and an oesophagotracheal fistula.

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Received 19 November 1992