

Button battery as a foreign body in the nasal cavities. Special aspects*

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SUMMARY

Alkaline batteries as foreign bodies in the nasal cavities are dangerous because they can cause liquefaction necrosis with subsequent severe local tissue destruction. Batteries found in the nasal cavities should be removed immediately to prevent sequelae such as septal perforations or nasal meatus stenosis. Due to the common use of these batteries (e.g. watches, electronic toys and games, calculators) physicians and the general public should be more aware of this type of foreign body and the peculiarities in their management. We present five cases of button battery foreign bodies in the nasal cavities and review 12 cases described in the literature and discuss the special aspects of these foreign bodies.

Key words: button battery, foreign body, nasal cavity

INTRODUCTION

Electric batteries in the shape of buttons or discs are being used more frequently everyday and can be found in a large number of electronic games, calculators, watches, et cetera. These small, shiny objects appeal to small children with a potential risk of becoming nasal, otological and oesophageal foreign bodies, as well as being capable in producing liquefaction necrosis when in contact with moist tissues. In the nasal cavities, button batteries can cause septal perforations and synechiae. In the ear, tympanic membrane perforation as well as skin necrosis of the external auditory canal with bone exposure, dysacusis due to ossicle destruction, facial nerve paralysis, and chondritis may occur. Burns, stenosis, perforations, oesophagotracheal fistules, lesions of the aortic arch, and death have been described after button battery ingestion.

There are more than 225 cases of electric battery ingestions reported (Kavanagh and Litovitz, 1986), but of these only 4 papers relate these objects in the nasal cavities, with a total sum of 12 cases described.

CASE REPORTS (TABLE 1)

Case 1

A 3-year-old girl presented to our service claiming to have introduced a "battery from an electronic game" into her right nostril, 3 h earlier. On examination, an inanimate foreign body was identified in the right nasal cavity and removed without difficul-

ty using Lucae forceps. She presented a large quantity of mucus discharge but no ulcerations, necrosis or hyperaemia were seen. Nasal saline solution was recommended. The patient returned after one week for follow-up examination presenting no sequelae and with an apparently normal nasal cavity.

Case 2

A 2-year-old boy was brought to our service with a history of having placed a watch battery in his nose, 12 h earlier. Physical examination showed an inanimate foreign body in the left nasal cavity which was removed with an Itard metal probe with moderate bleeding and no ulceration of the mucosa. Saline solution and neomycin ointment were prescribed for use during one week. The child returned after this interval, presenting no sequelae and with a normal nasal cavity.

Case 3

A 3-year-old boy presented to our service with a 12-hour history of having put a watch battery in his nostril. A foreign body was found in the right nasal cavity. After removal of the object with an Itard probe, a "rust-coloured" secretion and an ulcerated lesion of the cartilaginous portion of the nasal septum which had been in contact with the battery, as well as generalized oedema was observed. After one week, an oval crust was found over the region of the lesion. After one month, the mucosa had returned to its normal aspect, without sequelae.

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Table 1. Clinical cases

age/sex	description of battery	initial signs and symptoms	time of permanence in hours	clinical evolution
3/F	electronic game	mucous rhinorrhoea	3	normal
2/M	watch	bloody rhinorrhoea	12	normal
3/M	watch	rust-coloured rhinorrhoea	24	superficial burn, complete healing 1 month
5/M	-	nasal pain, fever, bloody rhinorrhoea and septal ulceration	-	deep burn, normal after 2 months
4/M	electronic calculator	bleeding 'rust-coloured' rhinorrhoea and hyperaemia of the nasal vestibule	12	superficial burn, erosion of the skin of the nasal vestibule

Case 4

A 5-year-old boy with a history of 24 h of nasal pain, fever and bloody discharge from the right nostril was brought to our service. On examination a button battery in the right nasal cavity (Figures 1 and 2) associated with a thick, dark, foul-smelling secretion was present. There was bleeding of the head of the inferior turbinate and the caudal margin of the cartilaginous septum. The foreign body was removed with Lucae forceps. Saline solution and neomycin ointment were prescribed. After 15 days, the patient presented an ulceration with crusts of the nasal septum at the site of the foreign body, as well as bleeding. The mucosa was found to be entirely regenerated after two months.

Case 5

A 4-year-old boy was referred to our service by an otolaryngologist with a history of having put a "battery from an electronic calculator" in his right nostril which was removed after 12 h, and then medicated with Amoxicillin, Diclofenac and nasal saline solution for 7 days. He presented slight nasal bleeding after this period. The child presented to our clinic after 17 days with a daily nasal "rusty" discharge. Examination showed a crust of the

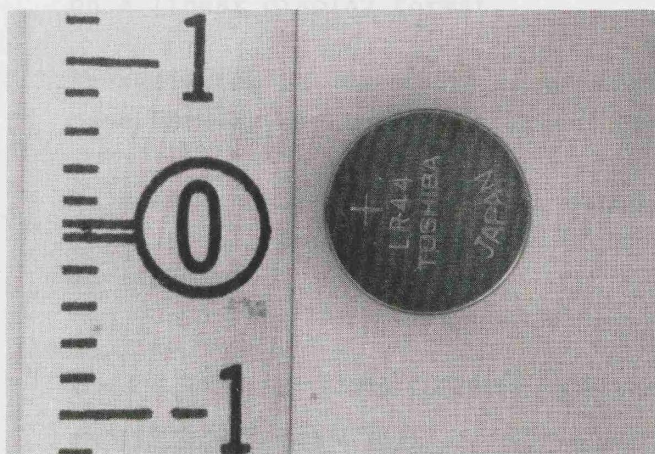


Figure 1. Top view of electric disc battery from case 4.

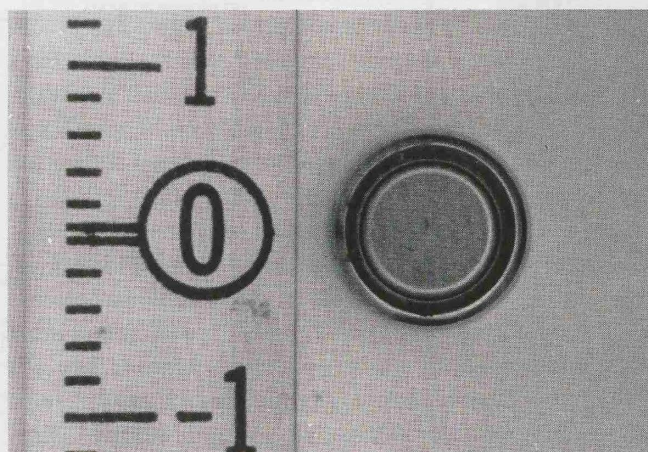


Figure 2. Bottom view of the same battery.

posterior portion of the right nasal septum, with no perforation, and hyperaemia of the skin of the nasal vestibule. Nasal saline solution and neomycin ointment were prescribed for 7 days. Satisfactory epithelization of the mucosa of the nasal septum was observed with slight erosion of the vestibular area.

DISCUSSION

Nasal foreign bodies are seen with relative frequency in the daily practice of paediatricians and otolaryngologists. The victims are usually children from 2-5 years of age, presenting unilateral foul-smelling rhinorrhoea, nasal obstruction and local pain.

We discuss the occurrence of a new type of foreign body, the disc electric battery which, because of its peculiar aspects, characterizes a medical urgency. These batteries are composed of various types of heavy metals: mercury, zinc, silver, nickel, cadmium, lithium, and have electrolyte concentrations of sodium or potassium hydroxide varying from 26-45% (Maves et al., 1984). Liberation of these substances can cause various types of lesions depending on the localization, with intense local tissue reaction and liquefaction necrosis. The alkalis penetrate the deep layers of the tissue causing solubilization of proteins and collagen, saponification of lipids, and dehydration of the tissues

and cells (Capo and Lucente, 1986). All of the layers involved present intense inflammatory reactions, differing from other types of more common burns in which only the superficial layers are involved due to coagulation necrosis. The electrical current generated between the anode and the cathode causes electrolysis. The sodium hydroxide and the chlorine gas liberated by the electrolysis collaborate to worsen the tissue lesion. Furthermore, the battery can cause pressure necrosis like any other foreign body lodged in a given area for long periods. The longer the battery remains in the nasal cavity, the larger and more severe the local lesions and the more frequent the complications will become.

In the case of ingestion, burns develop in an extremely short period less than 4 h and perhaps as little as 2 h, depending upon the battery charge and the size of the oesophagus. Oesophageal perforations were shown experimentally in cats after 8–12 h of exposure to the batteries (Maves et al., 1984).

In the nasal cavities pain, nasal obstruction and rhinorrhoea occur rapidly. Fever and mucopurulent discharge may appear a few hours later. After 48 h oedema of the cheeks and bloody rhinorrhoea may be seen. The major complications are septal perforations, nasal synechiae, constriction and stenosis of the nasal cavities, and these occurred in 4 out of the 12 cases reported in literature (Hong et al., 1987; McCombe and Ramadan, 1992).

Proper management involves immediate removal of the battery, with careful evaluation of the extent of the local damage. The burned areas should be protected with inert substances to avoid late sequelae such as synechiae or nasal stenoses. The site should be irrigated generously after the removal of the foreign body as to remove all residue of the alkaline precipitate liberated by the battery that may remain in the nasal cavity.

The patients, after removal of the nasal foreign body, should be followed for long periods – depending on the severity of the lesions – until the healing of the nasal mucosa is complete, in order to prevent complications. If tissue necrosis occurs, debridement should be performed. Our results show that patients in which the batteries remained for a longer period (cases Nos. 4 and 5) presented more severe lesions and took longer to return to normal conditions. In case 5, even though the time of permanence was not established, it was probably a prolonged

period since the battery was an examination finding whereas nasal pain and bloody rhinorrhoea were the motives to seek medical assistance.

The peculiar aspects of the lesions provoked by these foreign bodies in the nasal cavities should be emphasized to specialized medical personnel and those in academic formation, since these aspects are not described in text books on otolaryngology. This fact will probably be corrected shortly with the publication of cases which undoubtedly will become more frequent due to the wide use of these batteries in daily modern life. The industries that utilize electric disc batteries in their products should be educated by able health authorities as to hamper their handling, therefore decreasing the possibility of becoming foreign bodies. In conclusion: (1) All electric batteries found in the nasal cavities should be removed as quickly as possible; (2) the longer the battery remains, the greater the morbidity; (3) special education should be given to medical and paramedical personnel as to the unique aspects and the danger of these objects in the nasal cavities and ears; and (4) adequate attention in the manufacture of electronic equipment should be emphasized as to hamper the removal of the electric batteries.

REFERENCES

1. Capo JM, Lucente FE (1986) Alkaline battery foreign bodies of the ear and nose. *Arch Otolaryngol Head Neck Surg* 112: 562–563.
2. Hong D, Chu YF, Tong KM, Hsiao CJ (1987) Button batteries as foreign bodies in the nasal cavities. *Int J Pediatr Otorhinolaryngol* 14: 14–19.
3. Kavanagh KT, Litovitz T (1986) Miniature battery foreign bodies in auditory and nasal cavities. *JAMA* 255: 1470–1472.
4. Maves MD, Carithers JS, Birck HG (1984) Esophageal burns secondary to disc battery ingestion. *Ann Otol Rhinol Laryngol* 93: 364–369.
5. McCombe AW, Ramadan MF (1992) Nasal Button Battery (Letter to Editor). *Otolaryngol Head Neck Surg* 106: 317.

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