Disk battery in the nasal cavity: Case series

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ABSTRACT
Nasal foreign bodies are a common occurrence in children. We present three cases of disk (button) battery insertion into the nasal cavity. The complications associated with this type of foreign body are highlighted.

Key words:
Disk battery,
Nasal cavity,
Foreign body.

Case report

INTRODUCTION

Nasal foreign bodies are common occurrences in the Otorhinolaryngological practice (Fernando, 1987). The nose being a prominent feature of the facial skeleton is easily accessible for insertion of objects by children. Nasal cavity foreign bodies usually go unnoticed until the patient develops a unilateral foul smelling nasal discharge (Brown, 1994; Tong et al., 1992). We have encountered different types of nasal foreign bodies ranging from beads, beans seed, paper, foam, screws to battery button. Of the above mentioned objects, the button battery is a foreign body to be feared because of its destructive tendency.

The disk battery is an alkaline battery which is ubiquitous as it is used to power small portable electronic devices such as watches, calculators, toys, electronic games and hearing aids. Button battery has a metal can forming the bottom body with a circular insulated top cap. The can is the positive end and the top, the negative terminal. The electrolyte in the battery is alkali which creates burns when in contact with the mucous membrane by the process of liquefactive necrosis. The necrosis of mucosa in contact with button battery is well documented (Fernando, 1987; Brown, 1994).

We present three patients who had insertion of button battery in their nasal cavity, highlighting the special features and the dangers of this type of foreign body.

CASE ONE

A 4 year old female child was presented to the Otorhinolaryngology (ORL) clinic with a 24 h history of inserting a button battery into the left nasal cavity while playing. The battery was previously used to power her toy. She had no pain or nasal discharge. Attempts of removal had been made with a peripheral facility without success. Anterior rhinoscopy revealed secretions and blackish discharge mixed with bloody crusts filling the left nasal cavity. Radiological examination revealed a single round metallic foreign body in the left nasal cavity (Figures 1 and 2). She did not cooperate for manual office removal hence she was given a short general anaesthetic. Two hours later with retrieval of a round Silver (AG 13) battery measuring 11 mm in its widest diameter and 5 mm in height. There were superficial burns with blackish discoloration of the nasal septum and inferior turbinate where the battery had been in contact with the nasal mucosa. There was no septal perforation. The nasal cavity was then packed with paraffin impregnated antibiotic gauze which was removed after 24 h. She received prophylactic antibiotics nasal

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**Figure 1.** Lateral X-ray of the sinuses showing the disc-shaped foreign body overlying the nasal bone.

**Figure 2.** Occipito-mental view of the sinuses showing the radiopaque foreign body in the left nasal cavity.
toileting and lubrication. She had no other complication.

**CASE TWO**

A 2 years and 6 months old male infant presented at the Accident and Emergency Department with a 2 h history of button battery insertion into the right nasal cavity. An attempt had been made to remove it without success at a private clinic. Examination of the patient revealed an apprehensive uncooperative child. Anterior rhinoscopy revealed bloody crusts in the nasal cavity but no foreign body was visualized. Radiological evaluation of the nasal cavity revealed the presence of a posteriorly located round radiopaque object in the right nasal cavity. He had a short general anaesthesia and examination under anaesthesia revealed crusts and blackish discolouration of the nasal cavity mucosa with inflammation of the adjoining mucosa as well as a posteriorly displaced corroded Silver (AG13) disc battery. The battery was removed 8 h from the time of insertion. The nasal cavity was then irrigated, debrided and packed with paraffin impregnated antibiotic gauze. The nasal packing was removed 24 h later and he was discharged home the next day to continue post-clinical treatment on daily saline douching of the nasal cavity. He later developed excessive crusting of the right nasal cavity and ulcers on the inferior and middle turbinates. Nasal toileting was carried out on him and he was to have alternate day toileting in the clinic but he defaulted and represented three months later with marked narrowing of the right nasal cavity and was billed for scar tissue excision and stenting of the right nasal cavity.

**CASE THREE**

A 5 year old male was referred from a neighbouring State hospital with a day’s history of foreign body in the right nasal cavity. Attempts of removal had been made with a peripheral facility without success. This had provoked bleeding from the right nasal cavity. Examination revealed a young child with blood tinged discharge from the right nasal cavity. Nasal patency test revealed decreased nasal airway patency on the right side. No foreign body was visualized on anterior rhinoscopy but the inferior turbinate appeared to be partially avulsed. Paranasal sinus radiograph revealed a posteriorly located opaque foreign body in the right nasal cavity. A short general anaesthetic was administered and nasendoscopy was performed but no foreign body was visualized. The other findings were necrotic right inferior turbinate detached from the lateral wall, blackish slough on the septal mucosa but there were no septal perforation and exposure of the nasal floor bone. Debridement and stenting of the nasal cavity was done and was placed on antibiotics. Thoraco-abdominal radiography revealed a round opaque object in the recto-sigmoid area and he passed a disk battery in his stool 72 hours after the insertion. He had nasal stent removal on the 7th day. At the follow up visit 3 weeks later, he had developed mild stenosis of the right nasal cavity and is being followed up.

**DISCUSSION**

The nose is easily accessible by reason of it location on the face. Foreign body insertion into the nasal cavity is common among children, psychiatric patients and mentally challenged individuals. Several objects have been listed as nasal foreign bodies (Fernando, 1987). Most nasal foreign bodies in children usually go unnoticed until infection sets in to produces a foetid unilateral nasal discharge (Brown, 1994; Tong et al., 1992). This is usually resolved without sequelae following removal and treatment of underlying infection. This is however not the case when disk battery is the foreign body.

The alkaline disk battery clearly stands out as one of the most dangerous nasal foreign bodies encountered in literature (Fernando, 1987; Brown, 1994; Mc Rae et al., 1989). Nasal septum perforation and oesophageal mucosa perforation following button battery insertion and ingestion respectively have been reported (Fernando, 1987; Brown, 1994; Yardeni et al., 2004). The three cases reported had connection to battery used to power toys. The first patient reported the incidence herself. In the hands of a specialist, removal of nasal foreign bodies is possible in the office setting. Following initial failed attempts by untrained personnel, the children become apprehensive thereby necessitating the use of general anaesthesia. Two of the patients had prompt removal of the foreign body on presentation while there was delay in the third as the battery had migrated into the digestive tract and was passed out as stool. The first patient had the removal of the foreign body 28 h after insertion while the second patient was 10 h after insertion. Reports have shown that nasal mucosa damage can occur in as little as 90 min following insertion of the battery (Guidera and Stegehuis, 2010). While nasal septal perforation have been reported to occur within 7 h after insertion (Tong et al., 1992; Loh et al., 2003). Fortunately, none of patients presented developed a septal perforation.

Certain factors are said to be important in the development of complications associated with battery inserted into the nasal cavity. These include the time interval between insertion and removal of the foreign body (Guidera and Stegehuis, 2010), the orientation of the battery in the nasal cavity and the surface in contact with the negative pole (anode), more likely, is what causes damage. Hence, nasal septal perforations are
more likely to occur when the negative terminal is in contact with the septum (Guidera and Stegehuis, 2010). The aetiology of the tissue damage is believed to be threefold (Brown, 1994; Tong et al, 1992):

1. Leakage of battery content with direct corrosive damage;
2. Direct current effect on the mucosa and;
3. Less likely, pressure necrosis.

An electric circuit is thought to be completed once the battery comes in contact with both sides of the nasal cavity and the high ionic concentration of the nasal secretions; and this generates a local current that causes electrical and thermal burns (Tong et al., 1992). It was also noted that superficial burns occurred in all our patients irrespective of the duration of exposure.

Repeated attempts at removal of the foreign body may result in increased trauma and displacement of the object thereby making retrieval more difficult. Aspiration of the foreign body can even occur during these attempts. It is important to note that only personnel skilled in the management of nasal foreign bodies should attempt removal (Loh et al., 2003). The increased trauma and displacement of the foreign body may have predisposed to damage a larger surface area with potentially great morbidity. Although none of the patients developed septal perforation, there was marked morbidity especially in the second case. Prompt removal is the rule to avoid complications (Guidera and Stegehuis, 2010).

Conclusion

There is need for education of both physicians and the general public about the dangers of the ubiquitous button batteries. Children should be taught to avoid insertion of foreign bodies into their nose; and in the event of an insertion, it should be promptly reported to their parents and/or any available adult. Parents/caregivers should in turn present affected children early and directly to the hospital for removal. All nasal foreign bodies should be removed promptly to avoid the above complications if they do eventually turn out to be disk batteries.

REFERENCES