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Case Report

A case series of button batteries as nasal foreign bodies among children

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ABSTRACT

Foreign bodies are a common occurrence in children that may be either accidental or self-induced as a matter of habit. Various materials have been reported as foreign bodies like metal, plastic toy parts, food matters, etc. Button batteries have been reported as foreign bodies in the nose and are especially relevant, due to their early chemical disintegration in contact with mucosal surface; hence, need emergency surgical intervention to avoid complications like septal necrosis and perforation. Here, we report four cases of button batteries in the nose at various stages of presentation with their sequelae along with a review of literature.

Keywords: Button batteries, Nasal septal perforation, Para nasal sinuses, Occipito mental view

INTRODUCTION

The button battery is so called because of its shape and size. It is generally used in small devices, such as digital thermometers, toys, wrist watches and clocks, small sized torches, and small light-emitting diodes. Nasal foreign bodies in children often present to both general emergency physicians and otorhinolaryngologists. This constitutes with the majority of being plastic objects (particularly beads), jewelry pearls, foam, paper or cotton.[1] The aims and objectives were to study the various presentations and outcomes in a series of four children that presented with button batteries in the nose.

CASE REPORTS

Four patients of age group between 3 and 5 years, of which three are males and one female, who presented with button batteries as nasal foreign bodies at a duration ranging from 3 h to 84 h from the time of impaction where subjected to detailed history taking, clinical, radiological and nasal endoscopic evaluation, and prompt removal under general anesthesia.

The precise location of the button battery in the nose observed endoscopically, and the condition of the surrounding mucosal tissue of the nasal cavity surrounding the foreign body was observed immediately following the removal. The patients were followed up to a period of 3 months to 1 year for any late complications.

Amongst two early presenters, one had nasal mucosal ulceration, and one had nasal mucosal necrosis. Two late presenters had extensive mucosal and cartilage necrosis with subsequent septal perforation.

Hence, button batteries as foreign bodies should be treated as surgical emergency and definite, positive history should prompt the clinician for an immediate radiological confirmation, nasal endoscopic evaluation and prompt removal to avoid serious complications such as septal perforation.

Case 1

A 3-year-old male patient presented with unilateral nasal discharge, of 3 h duration. On examination, a brownish discharge from left nasal cavity noted. X-ray of para nasal sinuses (PNS) revealed a radio opaque foreign body in left nasal cavity. The foreign body was removed endoscopically under general anesthesia, which was

found to be impacted between the left middle turbinate and its corresponding nasal septum with mucosal edema, excoriation and brownish discharge. Patient was treated conservatively, and was followed up for a period of 3 months. The nasal mucosa was healed without any apparent permanent sequelae.

Case 2

A 3-year-old male patient presented with a history of brownish discharge from right nasal cavity and nasal obstruction for a period of 48 h. On examination, a profuse brownish discharge from right nasal cavity noted. X-ray of PNS had revealed a radio opaque foreign body in right nasal cavity. The foreign body was removed endoscopically under general anesthesia, which was found to be impacted between the right inferior turbinate and its corresponding nasal septum as seen in Figure 1 and 2 with extensive mucosal edema, ulceration of the inferior turbinate and the nasal septum with areas of patchy necrosis. The patient came for a delayed follow-up after a period of 1 month. Nasal endoscopy revealed a synechia at the level of inferior turbinate, which was excised endoscopically under general anesthesia. Nasal splints were applied, which was removed after 14 days. Further follow-up revealed a healed nasal cavity with a patent airway.

Case 3

A 4-year-old male patient presented with blood stained mucoid nasal discharge, for which his parents came for consultation to us. The history revealed a suspected 3 days old accidental foreign body impaction in the right nasal cavity. X-ray of PNS showed a radio opaque foreign body with partial destruction of the nasal septum. Under general anesthesia, nasal endoscopy revealed a button battery firmly impacted to the nasal septum. Following removal, a deep area of necrosis at the nasal septum was noted which healed with subsequent nasal septal perforation within a period of 15 days.

Case 4

A 5-year-old female patient presented with unilateral nasal obstruction and foul smelling nasal discharge. A detailed history revealed an accidental nasal foreign body impaction, which she didn't report to her parents initially out of fear of scolding. X-ray of PNS showed a radio opaque foreign body with severe destruction of the nasal septum. Under general anesthesia, nasal endoscopy revealed a button battery firmly impacted to the nasal septum. Following disimpacting, the septum was found severely necrosed with an intact opposite nasal septal mucoperichondrium. The nasal cavity was impregnated with antibiotic ointment. Follow-up after 2 weeks revealed healing of septal wound with perforation that enlarged further after a period of 2 months.

DISCUSSION

Foreign bodies impacted in the nose are quite a common occurrence amongst the pediatric age group. Various kinds of foreign bodies have been reported in the nasal cavity ranging from animate objects like peas, nuts, corn, etc, to small inanimate objects like plastic toy parts, beads, jewelry pearls, foam, paper or cotton, which are common household objects, to which toddlers and small children have easy access at home and the child's curiosity with such objects often leads to accidental introduction of such objects into the nose or accidental ingestion of these objects. Alessandro Volta[2] invented the electric battery in 1799. Since then, batteries have been widely applied in various electrical devices. The button battery is named after its shape. With the increasing use of electronic gadgets at home, the use of button batteries have increased in the recent years, and their use is a routine affair in almost every household. These batteries need to be replaced at regular intervals owing to their limited life span, and old unused batteries are frequently not disposed or destroyed as a mandatory household practice. Children are frequently attracted to such uncared for objects lying in gay abandon at home, and their curious nature leads to accidental impaction or ingestion of these objects.

Figure 1: Button battery in right nasal cavity at the level of inferior turbinate.

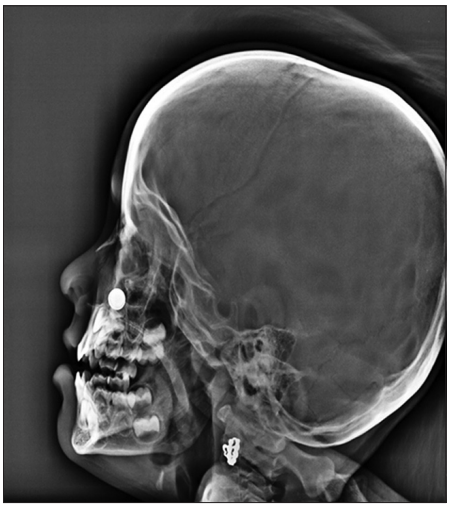

Figure 2: Button battery in nasal cavity.

Button batteries once lodged in the nasal cavity, trigger local mucosal irritation leading to increased rhinorrhoea. Button batteries that are frequently alkaline in nature reacts with the saline rich ions of the nasal discharge leading to further chemical disintegration. An active battery may even emit electrical impulses in an ion rich medium of the nasal mucosa. Chemical irritants and electrical discharge from the batteries can both have adverse toxic effects on the nasal mucosa which along with mechanical pressure of the hard impacted metal leads to local congestion, ulceration, necrosis of the mucosa and the cartilage. The amount of damage depends upon the duration of impaction, pressure effect of the impacted material and the narrow crevices are more extensively affected areas. Delay in presentation, diagnostic dilemmas and delayed surgical intervention all add up to the extent of damage in the nasal cavity which ranges from minor ulcerations to extensive necrosis of nasal mucosa and perforation and saddle shaped nose. Loh et al. and Tong et al. reported that damage to the nasal mucosa has previously been reported after as few as 3 h, with damage leading to perforation after 7 h.[3,4]

The first reported case of a button battery foreign body was in 1977 and involved a child who swallowed a camera battery, which lodged in the proximal esophagus.[5] Five types of batteries are in common use: manganese, silver, mercury, lithium, and zinc.[6] The vast majority of button batteries today are of the alkaline variety.[7] Four mechanisms of injury have been suggested: (1) Leakage of the battery contents with direct corrosive damage, (2) direct electrical current effects on the mucosa and resultant mucosal burns, (3) pressure necrosis resulting from prolonged local pressure on the tissue, and (4) local toxic effect due to absorption of substances: this can be the case in mercuric oxide batteries.[8-12] Premachandra and McRae reported that *in vitro* studies have shown that spontaneous leakage of electrolyte solution occurs when alkaline batteries are exposed to moisture. The leaked alkaline electrolyte solution can penetrate deeply into tissues producing a liquefying necrosis. This results in dissolution of protein and collagen, saponification of lipids, dehydration of tissue cells, and consequential extensive tissue damage.[13]

Symptoms and signs ranges from nasal irritation to pain and burning sensation in the nose, foul smelling profuse brownish nasal discharge and epistaxis. The main stay of diagnosis is detailed, and witness based history, radiological evaluation and diagnostic nasal endoscopy. Earlier the foreign body detected, lesser is the chances of complication. Hence, prompt removal of the button battery from the nose should be done under nasal endoscopic guidance and under general anesthesia, to avoid serious complications such as septal perforation.

In our case series, all the four patients of age group between 3 and 5 years, of which three are males and one female, who presented with button batteries as nasal foreign bodies at a duration ranging from 3 h to 84 h from the time of impaction. All underwent X-ray PNS and nasal endoscopic evaluation. Two patients presented with mucosal ulceration, necrosis and following removal of the foreign body, they presented with nasal mucosal synechia. The rest two patients presented with delayed septal perforation.

CONCLUSION

Early suspicion of accidental foreign body impaction in case of a child complaining of unilateral nasal obstruction with discharge or pain and discomfort remains the key to early detection of foreign body in children and this responsibility rests primarily with the parents and guardians of the children. Thorough history taking, compulsory radiological evaluation and prompt nasal endoscopic guided removal of the nasal foreign body under general anesthesia remains the sole responsibility of the otolaryngologists and these measures taken promptly without delay can only prevent serious complication in such events. It remains the duty on the part of the clinicians to educate the parents for safe handling and disposal of such common electrical commodities like button batteries to prevent these accidents among children.

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