



Button Battery: A Hazardous Nasal Foreign Body and a Cause of Septal Perforation. Two Case Reports

Christos Rokos¹, Iordanis Sidiropoulos^{1*}, Nikos Chrysohoidis¹
and Dionysios E. Kyrmizakis¹

¹Department of ENT, General Hospital of Veroia, Imathia, Greece.

Authors' contributions

This work was carried out in collaboration between all authors. Author CR designed the study and wrote the first draft of the manuscript. Authors IS, NC and DEK reviewed the manuscript. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/BJMMR/2016/19664

Editor(s):

(1) Salomone Di Saverio, Emergency Surgery Unit, Department of General and Transplant Surgery, S. Orsola Malpighi University Hospital, Bologna, Italy.

Reviewers:

- (1) Somchai Amornyotin, Mahidol University, Bangkoknoi, Bangkok, Thailand.
(2) Jaspinder Kaur, ECHS Polyclinic, India.
(3) Ajinkya Avinash Kelkar, Yashwantrao Chavan Hospital, Pune, Maharashtra, India.
Complete Peer review History: <http://sciencedomain.org/review-history/15332>

Case Report

Received 22nd June 2015
Accepted 15th July 2015
Published 9th July 2016

ABSTRACT

Aims: To report to cases of button batteries as nasal foreign bodies and to emphasize the unique clinical characteristics of this condition regarding diagnosis and management.

Presentation of Case: We report two boys, one 5-year-old who was found to have a button battery in his left nasal cavity for a long time and subsequently developed a septal perforation and a 4-year-old in whom the quick removal of the battery from his nose resulted in an uneventful fast recovery.

Discussion and Conclusion: The etiology of septal perforation is presented briefly. The mechanism and management of button battery injury are discussed. The time interval between insertion and removal, the battery's anode orientation and its thickness were the most important factors identified. The previous two cases highlight the management peculiarities of these rarely described foreign nasal bodies. Early removal and treatment, including antibiotics and nasal toilet, appears to offer the best prognosis.

*Corresponding author: Email: sidior@yahoo.gr;

Keywords: Nasal; foreign body; button battery; septal perforation.

1. INTRODUCTION

The nasal septal cartilage receives its blood supply from the mucoperichondrium. Any cause of disruption (traumatic, chemical, physical and iatrogenic) to this normal anatomy can lead to the development of a perforation. Septal perforations can be asymptomatic or different symptoms can appear, such as nasal crusting, obstruction, epistaxis, a whistling sound during nasal breathing if the perforation is located anteriorly and is rather small and saddle nose or tip drop if the perforation is large [1]. Button batteries are one of the unusual causes of septal perforation.

Button batteries have become increasingly popular as an energy source and are easily available in our domestic environment. Their small size and shiny surface makes them attractive to young children and they may be inserted into their nose or other orifices. Once inserted in the nasal cavity (or elsewhere in the body), button batteries are capable of generating local currents and/or liberate their alkaline contents, thus, causing extensive tissue damage resulting from electrical and chemical burns (severe and life threatening complications as esophagus perforation and strictures, tracheoesophageal fistula, mediastinitis, pneumothorax and others can appear) [2,3].

This is why immediate attention and proper treatment is required. We report two cases of nasal button batteries in children with very different outcomes.

2. PRESENTATION OF CASES

2.1 Case 1

A 5-year-old boy presented to the Emergency Department (ED) of General Hospital of Veroia complaining of nasal congestion, purulent discharge from the left nostril and epistaxis from both nostrils. Clinical examination and history taken from the parents and the patient gave no indication of a foreign body. In the initial visit the child was diagnosed with rhinosinusitis and was subsequently treated with oral antibiotics. Fifteen days later the patient visited the Ear Nose and Throat (ENT) department of the same hospital as he experienced no significant improvement of his symptoms. Anterior rhinoscopy of the left nostril revealed an edematous, hyperemic inferior

turbinate covered with purulent discharge. The nasal septum was necrotic and a dark colored object surrounded by crusting was noticed between the nasal septum and the inferior turbinate. Later on the same day, the object was removed under local anesthesia. It was found to be a thick (5 mm) disk battery with signs of extensive corrosion of its case (Fig. 1). After battery removal the child was treated with intravenous antibiotics (ampicillin plus sulbactam), intranasal mometasone furoate spray and nasal saline washout. The patient was hospitalized for three days. Twenty days later the child was examined in a scheduled follow up visit in our outpatient department. Anterior rhinoscopy and nasal endoscopy with a rigid 30°, 2.7 mm endoscope revealed a large septal perforation about two (2) cm in diameter (Fig. 2). Nasal mucosa had healed completely.



Fig. 1. The corroded battery after removal from the nasal cavity. It had remained there for several days

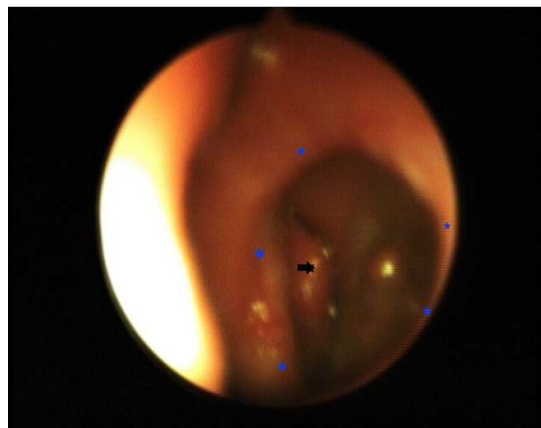


Fig. 2. The large septal perforation (asterisks) is shown during rigid endoscopy of the right nasal cavity. The left middle turbinate (arrow) is visible through the perforation

2.2 Case 2

A 4-year-old boy presented with his parents to the ENT outpatient department of General Hospital of Veroia saying that three hours ago he had put in his left nostril a button battery which he had removed from a toy. His parents had brought with them a similar battery which proved that was identical with the first one. Under local anesthesia and using an otologic hook for wax removal, the button battery was removed (Fig. 3). A slight epistaxis occurred and mucosa edema and redness were noticed in the area of middle septum and the opposite site of the lower turbinate. The patient was treated with oral antibiotics (cefuroxime) for a week, with intranasal mometasone furoate spray and nasal saline washout for three weeks. During the follow up, the boy was reexamined one week and two months later. His nasal mucosa healed. No perforations or adhesions were noted.



Fig. 3. The button battery in a rather good condition. It remained in the nose for only a few hours

3. DISCUSSION

There are many well-known causes of nasal septal perforation and others much less recognizable which can be divided in five categories: [1,3]

1. Traumatic causes of septal perforation which may be subdivided into external (traffic accidents, fighting, usually due to hematoma formation) self-inflicted (nose picking, foreign body in the nose), and iatrogenic causes (septoplasty or other nasal surgery, nasogastric tube placement, overzealous cauterization for epistaxis)

2. Inflammatory diseases such as collagen vascular diseases, Wegener granulomatosis, sarcoidosis, systemic lupus erythematosus, Crohn disease.
3. Neoplasms as T-lymphoma, carcinoma.
4. Infections as tuberculosis, syphilis, mucormycosis and other invasive fungal diseases.
5. Medications as cocaine, local corticosteroids (very rarely), long term use of local sympathomimetics as phenylephrine, bevacizumab (an anti-angiogenesis monoclonal antibody-VEGF inhibitor), docetaxel (a chemotherapeutic drug which belongs to the taxanes group)

One of the least known but very important to diagnose early is button (disk) batteries. Usually the patients are young children. The likelihood of nasal perforation depends on many parameters. The time that has elapsed until the removal of the battery seems to be the most important. The consequences of nasal perforation to nasal and face growth in young children are not well established.

There is limited research on nasal button batteries despite the fact that they may make up almost 7% of foreign bodies found in the nose. [4] The first case was only reported in 1986 [5].

Button batteries mainly contain mercury, silver, zinc, copper, cadmium or lithium [6]. Although the components may vary, the mechanisms of injury are similar. The main etiology of tissue destruction appears to be the direct current with its thermal [7] and chemical burn damage [8,9]. The other mechanism of injury is the direct corrosive tissue damage due to leakage of the battery's alkaline contents. [10] Mercury toxicity and pressure ischemic necrosis represent two more theoretical risks but researchers have come to the conclusion that they play a minor role in tissue injury [11-13].

Septal perforations, facial cellulitis, lateral nasal wall necrosis are all injuries associated with nasal button batteries reported in the literature [9,14]. The severity of tissue distraction seems to depend on the duration the battery is lodged in the nose, the state of the battery, its orientation and nasal factors such as the size of the nose and the amount of secretions [6,9]. As the clinical course of these patients depends strongly on the duration of mucosal exposure, aggressive diagnostic evaluation is indicated. Some authors have come to the conclusion that alkaline batteries can cause a septal perforation in only 7

hours or less [7]. Hence rapid tissue destruction makes the urgent removal of the battery mandatory.

Nasal foreign bodies must be suspected when a history of insertion exists or more commonly when a child is brought for evaluation of unilateral purulent rhinorrhea and/or unilateral or bilateral epistaxis as in the case of the first patient in this report. While button batteries in the nose are not common, they should always be in the differential diagnosis in order to be excluded. A recent review by Glynn et al showed that diagnosis of a button battery in the nose was not possible in most of the cases until removal under general anesthesia [12]. Endoscopy under local anesthesia, if available, may be attempted although this is not always successful in diagnosing or ruling out a nasal button battery due to lack of cooperation of the pediatric patient. Furthermore, when a button battery is suspected, the use of saline or vasoconstrictors should be avoided because they may provide electrolytes that increase the necrosis from the battery [13]. Several authors suggest that when thorough clinical examination is inconclusive a plain film skull x-ray should be performed in order to establish the diagnosis. Lin et al. have demonstrated the distinct double contour on plain films that aids in correct diagnosis [14].

Removal should be done under local (as in our cases) or general anesthesia. Nasal toilet and irrigation should be performed after removal to prevent further chemical injury. Most reports suggest that nasal toilet should continue until the nasal mucosa heals [15].

4. CONCLUSION

As a conclusion, button batteries as foreign bodies inserted into the nose are not common. They can cause, however, irreversible tissue damage. Septal perforation can occur in a short period of time. Its consequences on the nasal and facial growth of young children are not well understood. Regarding the management of these patients, if a positive history exists then the battery should be removed as soon as possible. In cases, however, with no history of foreign body insertion the clinician should have in mind that any child presenting with foul-smelling unilateral nasal discharge, bleeding or facial swelling may potentially have a nasal foreign body. Diagnostically, a thorough clinical examination including anterior rhinoscopy, endoscopy and, if inconclusive, radiography is

mandatory in order to rule out a foreign body and most importantly a disk battery. A nasal button battery is an emergency and should be removed as soon as possible in order to minimize the likelihood of long-term complications. We suggest that a nasal foreign body should be considered to be a button battery until proven otherwise.

CONSENT

All authors declare that written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. André RF, Lohuis PJ, Vuyk HD. Nasal septum perforation repair using differently designed, bilateral intranasal flaps, with nonopposing suture lines. *J Plast Reconstr Aesthet Surg.* 2006;59:829-34.
2. Umana A, Offiong ME, Mgbe RB, Etiuma A, Adekanye AG, Ewa AU, et al. Disk battery foreign bodies in children and major outcomes in the southern part of South Nigeria. *The Internet Journal of Otorhinolaryngology.* 2012;14:2.
3. Mailliez A, Baldini C, Van JT, Servent V, Mallet Y, Bonnetere J. Nasal septum perforation: A side effect of bevacizumab chemotherapy in breast cancer patients. *Br J Cancer.* 2010;103:772-5.
4. Yamashita M, Saito S, Koyama K, et al. Esophageal burns secondary to disc battery ingestion. *Ann. Otol. Rhinol. Laryngol.* 1984;93:364-369.
5. Capo JM, Lucente FE. Alkaline battery foreign bodies of the ear and nose. *Arch Otolaryngol Head Neck Surg.* 1986;112: 562-3.
6. Kalan A, Tariq M. Foreign bodies in the nasal cavities: A comprehensive review of the aetiology, diagnostic pointers, and

- therapeutic measures. Postgrad Med J. 2000;76:484-7.
7. Leeming MN, Jacobs RG, Howland WS. Low voltage, direct current plethysmograph burns. Med Res Eng. 1971;10:19-21.
 8. Tanaka J, Yamashita M, Yamashita M, Kajigaya H. Esophageal electrochemical burns due to button type lithium batteries in dogs. Vet Hum Toxicol. 1998;40: 193- 6.
 9. Loh WS, Leong JL, Tan HK. Hazardous foreign bodies: Complications and management of button batteries in nose. Ann Otol Rhinol Laryngol. 2003;112:379-83.
 10. Tong MC, Van Hasselt CA, Woo JK. The hazards of button batteries in the nose. J Otolaryngol. 1992;21:458-60.
 11. Mofenson HC, Greensher J. Ingestion of small flat disc batteries. Ann. Emerg. Med. 1983;12:88–90.
 12. Glynn F, Amin M, Kinsella J. Nasal foreign bodies in children. Should they have a plain radiograph in the accident and emergency? Pediatr Emerg Care. 2008;24: 217-8.
 13. Alvi A, Bereliani A, Zahtz GD. Miniature disc battery in the nose: A dangerous foreign body. Clin Pediatr (Phila). 1997;36:427-9.
 14. Lin VY, Daniel SJ, Papsin BC. Button batteries in the ear, nose and upper aerodigestive tract. Int J of Pediatr Otorhinolaryngol. 2004;68:473-479.
 15. Kiger JR, Brenkert TE, Losek JD. Nasal foreign body removal in children. Pediatr Emerg Care. 2008;24:785-92.

© 2016 Rokos et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
<http://sciencedomain.org/review-history/15332>