

IMPACTED BUTTON BATTERY IN THE NASAL CAVITY

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ABSTRACT

Button batteries as foreign bodies in the nasal cavities of children had the potential to cause extensive damage. Sometimes their removals were relatively easy, but sometimes could be very challenging. In this case, a 3-year-old boy had a button battery inserted in his nasal cavity for 2 days. Several attempts had been done to remove the battery in outpatient department but failed due to poor visualization. Therefore, the removal was done under general anesthesia by the guidance of imaging system to make the removal easier and prevent more damage.

Keywords: *button battery, nasal foreign body, guidance imaging system*

INTRODUCTION

Foreign bodies in the nasal cavities are common, especially in children and are relatively easily removed in outpatient department, but if the foreign body is a battery, special attention must be in thought, and can be very challenging. These kinds of foreign bodies have the potential to cause extensive damage.

Button batteries are common household items, powering many electronic devices and toys. Despite improvement in the safety designs of the products, children are still in serious danger to have these small things to play with. Being small, they can be easily inserted into various orifices such as the nose, ears and mouth, as foreign bodies (Loh, 2003).

Sometimes, if these batteries just have been inserted in the nasal cavities, they can be removed in outpatient

department. In cases in which the batteries have been left for longer duration, their removal can be difficult. In the following case, a button battery in the nasal cavity, which was failed to be extracted in outpatient department, was removed under general anesthesia with the guidance of imaging system.

CASE REPORT

A 3-year-old boy presented to the emergency department of Dr. Soetomo Hospital with button battery in his left nasal cavity for 2 days. He had inserted a button battery from a watch into his left nasal cavity while playing (Fig.1). Several hours after he inserted the button battery, he was referred to Bunder Hospital Gresik, but the removal was failed and he was advised to observe his faeces. Two days later, he was referred to Dr. Soetomo Hospital.



Figure 1. A watch button battery, after removal.

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Anterior rhinoscopy revealed that the inferior turbinate was very oedematous, hyperemia and covered by

serosanguineous discharge, but the foreign body was not seen. Anteroposterior and lateral x-ray views of the nose and sinuses revealed the presence of a metallic disc foreign body in the posterior part of the floor of the nasal cavity (Fig. 2).



Figure 2. Anteroposterior and lateral x-ray views of the nose and sinuses

Attempts of removal in outpatient department were failed because of poor visualization of the foreign body. The ring hook and blakesley tang could not find or feel the foreign body. Bleeding occurred and the attempt was terminated with a Kemicetine anterior nasal pack inserted to stop the bleeding. He was scheduled for general anesthesia in the next day.

inferior turbinate. To minimize the bleeding a piece of gauze ribbon with 1/1000 adrenaline was inserted. After waiting for the onset of action, the nasal cavity was being re-examined, but the foreign body was still not found. The imaging system using Image/C-arm, Siemen type sire mobile 2000 was prepared, and by its guidance, a Killian nasal speculum and a blakesley tang was inserted and the button battery was grasped and gently withdrawn (Fig. 3).

In the operating room, exploration of the nasal cavity revealed a profusely bleeding and very oedematous

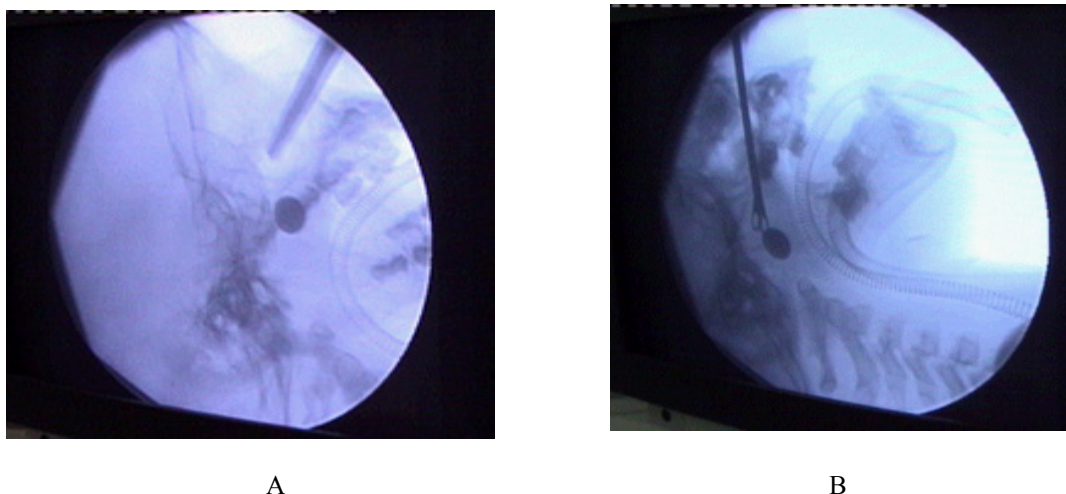


Figure 3. (A) Blakesley tang was inserted; (B) Button battery was grasped.

Exploration of the nasal cavity after the battery removal revealed extensive erosion and oedematous in the inferior turbinate. A lesion was seen on the septum but the cartilage was not exposed. The surrounding mucosa was covered by blackish secret and debris. After suctioning the debris and secret, a Kemicetine nasal pack was inserted. Antibiotic injection given since admission was continued. Two days later the nasal pack was removed, without any sign of bleeding found. The mucosa of the inferior turbinate and septum was slightly hyperemic. No perforation was seen and the patient was discharged on the fourth postoperative day in good condition. Follow up visit 2 weeks later revealed normal nasal cavity.

DISCUSSION

Foreign bodies in the nasal cavity do not feature largely in otolaryngological literature, yet on occasions they may pose a considerable challenge to both the diagnosis and surgical skills of the otolaryngologist, especially if the foreign bodies are harmful and can cause extensive damage to the surrounding mucosa, such as button batteries.

Button batteries contain mercury, silver, zinc, manganese, cadmium, lithium, sulphur oxide, copper, brass, or steel. These are the components of the anode, cathode, and case containing the battery. Button batteries also contain sodium hydroxide or potassium hydroxide to facilitate the electrochemical reaction through the separator (Skinner, 1986; Kalan, 2000; Dire, 2002).

Button batteries vary in diameter from 7.9-23 mm and in weight from 1-10 g. The diameter of disk batteries is less than 15 mm in 97 % of cases. The most frequent sizes are 11.6 mm in 63% and 7.9 mm in 30% of cases (Skinner, 1986, Dire, 2002).

In this case, the watch button battery was silver oxide battery with 10.5 mm in diameter and the color was blackish (normal color is silver) as well as the surrounding mucosa, when it was removed 3 days after being lodged in nasal cavity. Surrounding moisture in the nasal cavity results in corrosion of the battery casing, thereby liberating its contents. More importantly, the batteries can generate local currents resulting in thermal burns and extensive damage to the surrounding mucosa.

Etiology of the tissue damage appears to be threefold: 1. leakage of the battery contents with direct corrosive damage, 2. direct current effects on the mucosa, and 3.

less likely, simple pressure necrosis. Experimental evidence implicates direct current as the primary cause of tissue destruction. The high electrolyte composition of tissue fluids generates a current between the battery cathode and the anode, resulting in the hydrolysis of tissue fluids and the generation of corrosive hydroxides (Capo, 1986; McRae, 1989; Tong, 1992; Brown, 1994; Palmer, 1994; Alvi, 1997; Loh, 2003).

Liberation of the contents of the battery causes various types of lesions depending on the localization, with an intense local tissue reaction and liquefaction necrosis. The nasal injuries noted in the literatures included localized nasal mucosal necrosis, septal perforation, facial cellulitis and lateral nasal wall necrosis (Kalan, 2000; Loh, 2003). Nasal button battery impaction may produce mucosal turbinate and septal ulceration in as little as three to six hours. Necrosis of the inferior turbinate has occurred at 24 hours (Tong, 1992). In this case, no perforation of the septum was noted except severe erosion and oedematous in the inferior turbinate. They might be caused by the chemical content of the battery, in addition to the several failed removal attempts.

Frequently the foreign body can be seen on anterior rhinoscopy (and sometimes on posterior rhinoscopy), but on several occasions the mucosal oedema or granulation will hide it. If the foreign body is easily seen, and the patient is a cooperative child, it is usually possible to remove the object through the anterior nares, either without anesthesia, or after spraying local anesthetic solution such as tetracaine or lidocaine. In this case, the battery was not seen on anterior rhinoscopy and needed x-ray examinations to localize the battery.

In the literature, most authors agree with the need for urgent removal of batteries lodged in the nasal cavity. Some authors emphasized that unskilled attempts to remove the foreign body in the emergency department, by personnel without appropriate training, may result in disaster; the foreign body may be displaced backwards and may even reach the nasopharynx with risk of inhalation; epistaxis may occur; and a docile child may become terrified and require a general anesthesia and admission to hospital which might have been avoided (Gomes, 1994; Loh, 2003).

In this case, when the patient came in the outpatient department of Dr. Soetomo Hospital, the visualization of the foreign body in the nasal cavity was already poor. That condition maybe due to the failed removal attempts in Bunder Hospital. In addition, the several removal attempts by blind approaches in the outpatient

department made the visualization worse by profuse bleeding and increasing oedema. Therefore, a general anesthesia was scheduled in the next day.

However, few recommended immediate removal in the operating room if one cannot retrieve them in the outpatient setting. It is important to wait for ideal facilities, especially an experienced anesthetist. Unskilled manipulation in adverse conditions can lead to inhalation of the foreign body or of blood. At present, there is no guideline as to its removal to prevent occurrence of irreversible complications (Loh, 2003).

A general anesthetic will be required in the following circumstances : 1. if the patient is uncooperative or very apprehensive ; 2. if there is likely to be troublesome bleeding, for instance if the foreign body is firmly embedded in granulation tissue ; 3. if the foreign body is posteriorly placed with a risk of pushing it back into the nasopharynx ; 4. If a foreign body is strongly suspected but cannot be found, and more extensive examination of the nose is required, with the opportunity to deal with whatever is found (Ransom, 1987). In this case the guidance of imaging system was very helpful and makes the removal easier and could prevent more damage.

There is some evidence that the use of saline or vasoconstrictors may provide electrolytes that increase the necrosis from button batteries (McRae, 1989; Alvi, 1997). Thus, when a button battery is suspected to be present in the nose, saline or vasoconstrictors should not be instilled to facilitate the examination until x-rays exclude the existence of button battery foreign body. In this case, the use of adrenaline did not give any bad result, maybe because of the immediate removal of the battery.

CONCLUSION

Button batteries in the nasal cavity are harmful foreign bodies that can cause tissue damage. Removal of these foreign bodies can be difficult because of poor visualization of the foreign bodies caused by mucosal reaction to the contents of batteries. In this case, the difficulty was caused by profuse bleeding, very

oedematous and extensive erosion of the inferior turbinate. Removal was done by the guidance of Image/C-arm, Siemen type sire mobile 2000.

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