


Presentation and management of nasal foreign bodies in a Chinese metro area

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Abstract

Nasal foreign bodies in children are common complaints encountered by pediatric otolaryngologists. We investigated clinical features, diagnosis, and treatment of nasal foreign bodies in children in a Chinese metro area.

Six hundred sixty eight children with nasal foreign bodies presented to Shenzhen Children's Hospital, diagnosed and treated by the authors were enrolled from January 2016 to October 2019, causes for medical consultation, age, sex, duration, types, locations, removal, and complications were recorded and analyzed.

Nasal foreign bodies were common in children between 1 and 5 years of ages (96.8%). The right nasal cavity (61.4%) was the most common site for foreign body insertion (61.4%). Most of the children (89.4%) presented for a complaint of nasal discomfort or foreign body insertion themselves, or for foreign body impaction discovered by the caregivers. Most of the foreign bodies (85.0%) were discovered within 1 day. The most nasal foreign bodies were the whole toys and toy parts (34.1%). The majority of nasal foreign bodies (99.1%) located in the antero-inferior portion of the nasal cavities and could be removed with simple instruments. The occurrence of complications in nasal foreign bodies (10.2%) was not common.

The present study objectively exhibited clinical features, diagnosis, and treatment of nasal foreign bodies in a Chinese metro area.

Abbreviation: ENT = ear, nose, and throat.

Keywords: child, foreign body, management, nose, presentation

1. Introduction

Nasal foreign bodies in children are common complaints encountered by pediatric otolaryngologists. A wide variety of objects may lodge in the nasal cavities. With the change in the social environment, the types of nasal foreign bodies have altered. For example, button battery, as a power supplier for remote controller devices, watches, toys, and hearing aids, is widely used in daily human life. It provides much convenience for human. However, people have not realized that it is a potential hazard as a foreign body for children. In addition, there are some

differences between urban and rural areas. The older children usually complain of foreign body inserted in the nose and the younger children often present for discomfort discovered by their guardians. Based on the present social condition, we conducted this study to explore the clinical characteristics, diagnosis, and treatment of nasal foreign bodies in a Chinese metro area, and aim to provide healthy support and guidance for the medical community and the public and to get attention to nasal foreign bodies of them.

2. Materials and methods

The records of all pediatric patients presenting to the Department of Otolaryngology, Shenzhen Children Hospital, diagnosed and treated for nasal foreign body from January 2016 to October 2019 were retrospectively reviewed. Demographic and clinical data were recorded, including: gender, age, causes for presentation, foreign body type, location, duration, removal methods, and complications.

The study compiled with the principles of the Declaration of Helsinki on Biomedical Research Involving Human Subjects and was approved by the Ethical Review Board of Shenzhen Children's Hospital (protocol number 2021028). Written informed consent was obtained from each child's parent or supervisor.

3. Results

3.1. Demographic data

Over the three-year-and-ten-month period 668 Chinese children with a nasal foreign body presenting to the Department of Otolaryngology, Shenzhen Children's Hospital were enrolled. The average age was 3.21 years with a range from 5 months to 15

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SY and NZ contributed equally to this work.

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The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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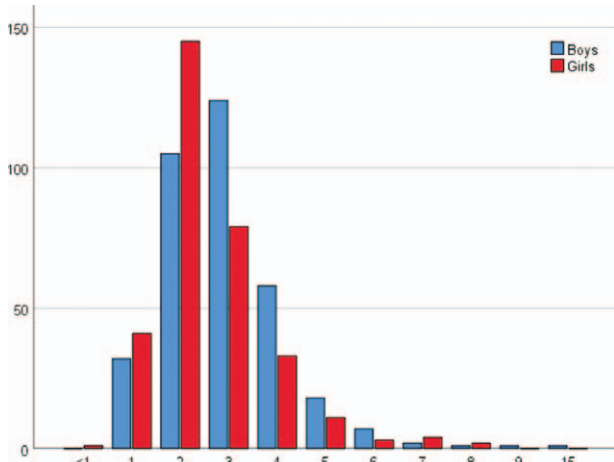


Figure 1. Distribution of pediatric patients by gender and age.

years (Fig. 1). Six hundred forty six children (96.8%) aged from 1 to 5 years and 544 children (81.3%) were between 2 and 4 years. There were 349 boys (52.2%) and 319 girls (47.8%), and the sex distribution was fairly even (boy:girl = 1.09:1). The occurrence of age peaks in boys and girls was 3 years and 2 years, respectively.

3.2. Causes for presentation

Five hundred ninety seven children (89.4%) presented for a complaint of nasal discomfort or foreign body insertion themselves, or for foreign body impaction discovered by their guardians. Two hundred seventy five children (41.2%) presented with rhinorrhea, of whom 255 children (38.2%) presented with watery rhinorrhea. Nineteen (2.8%) of 20 children with brown discharge and bubbles were listless and irritable for button cell insertion, and 1 presented for foreign body impaction accidentally noticed by his mother.

Sixty eight children (10.1%) presented for complications, such as foul smelling, purulent discharge, and blood-stained discharge. Foreign bodies were discovered accidentally in 20 children (3.0%) presenting during ear, nose, and throat (ENT) consultation.

3.3. Duration of foreign body impaction

After foreign body insertion, 568 children (85.0%) presented within 1 day, 29 children (4.3%) presented more than 1 day but within 1 week, 21 children (3.1%) presented more than 1 week, and 50 children (7.5%) presented with unidentifiable time (Table 1). Nineteen of 20 children with button battery impaction presented within 1 day, and 1 presented with unidentifiable duration.

Table 2

Types of nasal foreign bodies.

Type of nasal foreign body	Number	Percentage
Toy	228	34.1%
Fruit and vegetable	187	28%
Ornament	93	13.9%
Household item	54	8.1%
Medicine and processed food	17	2.5%
Button battery	20	3%
Sponge and Styrofoam	17	2.5%
Stationery	24	3.6%
Food packaging	11	1.6%
Others	17	2.5%
Total	668	100%

3.4. Types and locations of foreign bodies

The types of foreign bodies included the whole toys and toy parts (34.1%), fruit and vegetables (28.0%), ornaments (13.9%), etc. (Table 2). Seventeen cases (2.5%) of foreign bodies could not be identified. Two hundred forty eight cases (37.1%) were from the left nasal cavity, compared to 410 cases (61.4%) from the right and bilateral insertion in 10 cases (1.5%). In total, 662 cases (99.1%) were impacted between the posterior part of the nasal vestibule and the antero-inferior part of the nasal cavity proper. These foreign bodies could be removed with simple pieces of equipment in the consultation room. Six cases (0.9%) located in the medio-posterior part of the nasal cavity, general anesthesia was required for foreign body removal.

3.5. Complications

Complications occurred in 68 children (10.1%), sinonasal infection being the most common complication (7.0%), followed by epistaxis (3.1%). Of whom with epistaxis, 19 children’s nose was impacted by button battery. After foreign body removal, severe mucosal ulceration was found on the location where the button battery had lodged. In an asymptomatic case with button battery insertion, the button battery was covered by a lot of dried mucus and mild mucosal burn injury was noticed after button battery retraction. Only 5 of 20 children went in for follow-ups after button battery removal. The follow-up periods were from 7 days to 2 years and 9 months (2 cases: 7 days, 1 case: 1 month and 10 days, 1 case: 4 and a half months, and 1 case with adenoid hypertrophy: 2 years and 9 months).

4. Discussion

Nasal foreign bodies occur commonly in children. They are managed at Children’s Hospital and are encountered by pediatric otolaryngologists frequently.^[1] Although a wide variety of

Table 1

Causes for presentation and duration of foreign body impaction.

Cause	≤1 day	≤7 days	<7 days	Unidentifiable duration	Total
Complaining of foreign body insertion by children and discovered by guardians	553	23	3	18	597
Presented for nasal symptoms	7	2	16	26	51
Discovered accidentally at medical visits	8	4	2	6	20
Total	568	29	21	50	668

objects can be found in the nasal cavities, the types of foreign bodies are associated with children's living surroundings.^[2,3] Based on the Chinese present social condition, we conducted this study to explore the clinical characteristics, diagnosis, and treatment of nasal foreign bodies in a Chinese metro area, and aim to provide healthy support and guidance for the medical community and the public and to get attention to nasal foreign bodies of them.

According to the age distribution, the majority of children presenting to our unit were between 1 and 5 years of age, especially ranged from 2 to 4 years, which is in line with previous reports.^[1,2,4] The high incidence of nasal foreign bodies of this age span is associated with psychological and physiological factors during growth.^[5-7]

The sex ratio showed that the sex distribution was fairly even in the present study, but some literature revealed a significant difference between boys and girls.^[8-15] The highest occurrence in girls was 1 year earlier than in boys, this may be the result of the differences of psychological and physiological factors between boys and girls. Girls' growth development is earlier than boys', which made girls explore their surroundings earlier and increased the incidence of the accidents.

Accidents occur generally at play indoors. There is a wide variety of nasal foreign bodies, according to children's surroundings.^[14,16,17] The majority of the nasal foreign bodies were the whole toys and toy parts, fruit and vegetables, and ornaments, since it is easy for children to get these objects. However, some uncommon objects, such as stone, glass and button batteries can be discovered in the nasal cavity. The inorganic was more common than the organic. The types of the nasal foreign bodies indicated that the synthetic compounds predominated in a metro area, while grains and seed are more common in a rural area.^[14-16,18-20]

The right nasal cavity was the most common site for foreign body insertion, which is in line with previous reports.^[4,18,20] Because most children are right-handed, it leads to the fact that foreign body impaction is more common in the right nasal cavity. Our finding showed that it is a minority of bilateral insertion (1.5%), which is similar to previous reports.^[4,20] Most of the foreign bodies located between the posterior part of the nasal vestibule and the antero-inferior part of the nasal cavity proper. These foreign bodies could be visualized by anterior rhinoscopy and be removed with simple pieces of equipment in the consultation room. However, the minority lodged in the medio-posterior part of the nasal cavity. In such conditions, general anesthesia was required for foreign body removal as foreign bodies out of reach in the consultation room. Children's uncooperativeness may increase the necessity of general anesthesia.

The small percentage of children necessitating foreign body removal under general anesthesia in our study was associated with the following factors. The majority of the foreign bodies located between the posterior part of the nasal vestibule and the antero-inferior part of the nasal cavity. These foreign bodies were easy to be seen and could be removed in the consulting room. Pediatric patients also benefited from the qualified authors in this field. If an otolaryngologist is not experienced, it is easy to push a foreign body deeper into the nose. In the present study 6 children presented for improper management in other hospitals, and 1 child required foreign body removal under general anesthesia for a foreign body pushed deeper into the nose.

The causes of presentation were divided into 3 distinct conditions. First, most of the children presented for complaining of nasal discomfort or foreign body insertion themselves, or for foreign body discovered by the guardians. These cases presented as emergencies, the symptom was non-specific. Second, some children presented for foul smelling alone or accompanied by purulent or blood-stained discharge. In the last condition, there was no nasal symptom during ENT consultation, the foreign body was discovered by anterior rhinoscopy accidentally. In the first condition, children's symptoms were non-specific, but watery discharge in the nasal cavity with foreign body impaction were founded in 282 out of 668 children. Watery discharge was secreted for foreign body irritation to the nasal mucosa. Botanical foreign bodies are more irritating to nasal mucosa compared with other foreign bodies, excluding button batteries.^[15] Because of button cell insertion 19 children with brown discharge and bubbles were listless and irritable. Mucosal ulceration was found on the location where the button battery lodged after button battery removal. Four mechanisms have been involved in the tissue injury due to button battery insertion:

1. the leakage of the battery contents with the direct corrosive damage to the nasal mucosa;
2. the direct electrical current effects on the nasal mucosa and the resultant mucosal burns;
3. the pressure necrosis of the surrounding tissue;
4. the local toxic effect due to the absorption of substances: this can be the case in mercuric oxide batteries.^[21]

The exudation of tissue fluids caused by a burn injury creates a moist environment. 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 liquefactive necrosis. This results in dissolution of protein and collagen, saponification of lipids, dehydration of tissue cells, and consequential extensive tissue damage.^[22] According to children's mental status and damage to the nasal mucosa after foreign body impaction, button batteries can cause great damage in a short time. If a child suspected of nasal foreign body presents with brown discharge and bubbles in the nose, attendings should be alert to the possibility of button battery insertion. The damage from a button battery depends on its exposure time, remaining voltage, and capacitance. For example, 1 case of button battery impaction presented without aforementioned symptoms in the present study, the button cell was covered by a lot of dried mucus and only mild mucosal burn injury was noticed after button battery retraction. This case suggested that the button cell had lodged in the nasal cavity for a long time, mild mucosal burn injury may be the result of multi-factors, and exposure time is not the leading affecting factor.

The occurrence of complications is associated with several factors, such as types and duration of foreign bodies, caretakers and children's cooperation and attendings' skillful management. Thus the reported occurrence of complications varies and is associated with the aforementioned affecting factors. In our study, the 2 most common complications are sinonasal infection and nosebleed, and their occurrence was 7.0% and 3.1%, respectively. Oral or topical antibiotic therapy with saline solution flushing of the nasal cavities was required in some cases of sinonasal infection secondary to foreign body impaction. Epistaxis occurred in 21 cases during foreign body removal and 1 case with blood-stained discharge for the irritation of a foreign

body. Nosebleed is usually mild and of quick resolution spontaneously.^[2,3] In our study, no patient required cauterizing or nasal packing, since epistaxis could be controlled by finger compressing only. However, nosebleed was severe in cases of button battery impaction, and ulceration in the nasal mucosa might occur. Septal perforation due to button cell impaction was reported widely,^[4,15,20,21,24,25] but no such complication occurred in our study. Only 5 of 20 children with button battery retraction went in for follow-ups. The follow-up periods were from 7 days to 2 years and 9 months. The longest follow-up-period case is associated adenoid hypertrophy, not with secondary injury from button battery. Most caregivers think that the problem is solved after button battery removal and overestimate the severity of the secondary injury. This opinion leads to the small number of cases for follow-up and relatively short follow-up periods. These factors contribute to the result that no septal perforation was found in our research. Overall, our study demonstrated that the occurrence of the complications was not common and the management of the complications was relatively easy.

Foreign body in the nose is a common complaint for medical consultation. Prevention is the key to the management of foreign body impaction. Prevention should focus on increasing public awareness of it. Children can put nostril-fitting objects into the nose. Caregivers should keep small objects and those which can be broken down into small pieces out of reach of children. Children should be told not to insert anything into the nose. Manufacturers and vendors should warn consumers that products and parts of them may become foreign bodies for children.

There is a main limitation in our study. Because our study span was 3 years and 10 months, we can not find seasonal differences in our study. To investigate whether there are differences in the types of foreign bodies among seasons, further research with longer time span expanded to the whole-year period is warranted.

5. Conclusion

Our study demonstrated the clinical characteristics, diagnosis, and treatment of nasal foreign bodies in a Chinese metro area. Nasal foreign bodies are common in children between 1 and 5 years old. The occurrence of age peaks in girls was 1 year earlier than in boys. The majority of nasal foreign bodies can be removed with simple pieces of instrument in the consultation room.

Author contributions

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