

PAULA PIÓRKOWSKA¹, MARIA WOLNIEWICZ², *LIDIA ZAWADZKA-GŁOS²

Residual nasal foreign body – a case report and review of literature

Zalegające ciało obce nosa – opis przypadku i przegląd literatury

¹Students' Medical Association of Pediatric Otolaryngology "Otorhino", Medical University of Warsaw, Poland

Supervisor of Association: Maria Wolniewicz

²Pediatric Otolaryngology "Otorhino", Medical University of Warsaw, Poland³Department of Pediatric Otolaryngology, Medical University of Warsaw, Poland

Head of Department: Associate of Professor Lidia Zawadzka-Głos, MD, PhD

KEYWORDS

nasal foreign body (NFB), residual NFB, nasal mucous ulcerations, granulomatosis of the nasal mucous, unilateral purulent nasal discharge, unilateral rhinitis, emergency ENT, septal perforation

SŁOWA KLUCZOWE

ciało obce nosa, zalegające ciało obce, owrzodzenie błony śluzowej nosa, ziarninowanie błony śluzowej nosa, jednostronny ropny wyciek z nosa, jednostronny nieżyt nosa, otorynolaryngologiczny stan nagły, perforacja przegrody nosa

SUMMARY

Nasal foreign bodies (NFB) account for up to 4.3% of all emergency otorhinolaryngological consultations in pediatric population. They mainly concern children aged 2-5 years old. If they remain unnoticed by a parent (e.g. event happening without parental control, NFB hidden and forgotten by a child), they may stay asymptomatic for an unknown period (depending on the type of NFB and various additional circumstances) until further complications develop. Prolonged undiagnosed NFB may result in cartilage necrosis, what may lead to septal perforation or in extreme cases even to sepsis and meningitis. That is why, it is important to increase parents' and caregivers' awareness concerning this problem to prevent such hazardous complications. In our article we would like to present a case of a 2.5-year-old girl referred to our department by a pediatrician due to unilateral rhinitis with suspected residual nasal foreign body since unknown period, followed by mucous healing complications. We also conducted a literature review concerning the issue of NFB, and then analyzed.

STRESZCZENIE

Ciała obce nosa stanowią ok. 4,3% otorynolaryngologicznych stanów nagłych w populacji pediatrycznej. Problem ten dotyczy przede wszystkim dzieci w wieku 2-5 lat. Jeżeli pozostaną niezauważone przez opiekuna (np. zdarzenie bez nadzoru rodziców, ciało obce „ukryte” przez dziecko, a następnie zapomniane), mogą pozostawać bezobjawowe przez okres trudny do sprecyzowania (zależnie od rodzaju ciała obcego oraz towarzyszących okoliczności), aż do rozwinięcia się powikłań. Długotrwałe zalegające i niezdiagnozowane ciało obce w nosie może w konsekwencji prowadzić do poważnych powikłań, takich jak: martwica chrząstki, prowadząca w dalszym etapie do perforacji przegrody nosa, a nawet posocznicy czy zapalenia opon mózgowo-rdzeniowych. W związku z tym niezwykle istotne jest zwiększanie świadomości rodziców i opiekunów dotyczących tego problemu, by zapobiegać poważnym, zagrażającym życiu powikłaniom. W naszej pracy chcielibyśmy przedstawić przypadek 2,5-letniej dziewczynki skierowanej na oddział otolaryngologiczny przez lekarza pediatrę z powodu jednostronnego nieżytu nosa z podejrzeniem ciała obcego zalegającego przez nieznaną okoliczność, z powikłaniem w postaci zaburzeń miejscowego gojenia błony śluzowej. Przeprowadziliśmy także przegląd literatury na temat ciał obcych nosa.

INTRODUCTION

Foreign bodies (FB) stand for a frequently encountered problem in a pediatric population. According to the literature nasal foreign bodies (NFB) contribute to about one third

of all foreign bodies in the ENT clinics (1-3) and about 4.3% of all ENT consultations (1). They mainly concern children aged 2-5 years old (4-7) and are attributed to growing child's curiosity and autonomy. Parents often witness the incident

and quickly seek for medical aid, therefore most of the NFB are successfully removed within 24 hours with no further complications. They may cause local symptoms like irritation, pain and nasal obstruction, when longer persisting a local inflammatory process with unilateral discharge and unpleasant smell may develop, eventually in more severe cases they may lead to sinusitis, septal perforation, even sepsis or meningitis (1-8). For that reason, in case of any NFB suspicion appropriate precautions should be undertaken to avoid further complications.

CASE REPORT

A 2.5-year-old girl presented to the Emergency Department of the University Hospital of Medical University of Warsaw, referred by a pediatrician due to unilateral, right-sided rhinitis with suspected residual nasal foreign body since unknown period. Unilateral rhinorrhea with aggravated nasal pain occurred on the day of the consultation. Apart from that a child has been treated due to an upper respiratory tract infection since week. Parents denied witnessing an episode of NFB insertion, and that's why the estimated residual time and the type of an object were impossible to identify. The otorhinolaryngological (ORL) examination revealed a disintegrating object adhering to the septum in the right nasal cavity, massive inflammatory changes with oedema and dilated vessels of the right nasal mucosa. However, thorough assessment of the nasal cavity was impaired due to excessive purulent and bloody discharge, intensified by further manipulations. Multiple attempts to remove the foreign body resulted in removal of a bigger particle of an object and suspicion of its fragmentation. That's why a child was qualified for a precise examination under general anaesthesia. We performed endoscopic examination with the use of rigid endoscope that did not reveal any residual FB elements. But it showed extensive inflammatory changes with granulation and necrotizing



Fig. 1. Endoscopic view of the right nasal cavity: massive inflammatory changes to the nasal mucous – granulomatosis, ulcerations and necrotizing tissue, rounded-shaped depression on the septal wall – potential residual location for the NFB (own clinical material)



Fig. 2. Endoscopic view of the right nasal cavity after saline irrigation: reddened, edematous mucous with a tendency to bleed (own clinical material)



Fig. 3a, b. Endoscopic view of the right nasal cavity: massive inflammatory changes to the nasal mucous as described above, right-deviated nasal septum with a bony spur, additionally impairing the nasal patency (hardly letting through an endoscope), middle turbinate in the back; yellowish coating was primarily (during standard rhinoscopy on consultation) interpreted as residual fragments of a disintegrating object (own clinical material)

mucosa, as well as local depression of the mucosa on the septal wall, what was interpreted as a potential residual location for the NFB. Apart from that endoscopy proved septal deviation, irrelevant to the case. The mucous of the left nasal cavity was unremarkable (fig. 1-3a, b).

On the next day after procedure patient was discharged from the hospital with recommendations including both systemic and topical antibiotic therapy in a form of amoxicillin with clavulanic acid and gentamycin with betamethasone ointment, as well as intranasal saline to ensure local cleaning. First follow-up visit was planned one week after discharge. Due to unsatisfactory healing process in repeated ambulatory controls, 1.5 months after the initial hospitalization a child was qualified for another endoscopic control with biopsy. Rigid endoscopy proved inflammatory changes of the mucous in the right nasal cavity with less intensity and lower granulomatosis than initially, but with 2 ulcerations exposing the septal cartilage and the inferior nasal turbinate, and a small adhesion between the septum and the inferior turbinate were detected. Surgical release of the adhesion was done, and then the biopsy from the right inferior nasal concha was taken. Histopathology results proved inflammatory changes with necrotizing tissue. In order to exclude systemic autoimmune vasculitis blood samples for specific antibodies were collected. The results for all antibodies, namely antineutrophil cytoplasmic antibodies (ANCA), myeloperoxidase (MPO) antibody, serine proteinase 3 (PR3) and antinuclear antibodies (ANA), were negative. Our patient was discharged home in a good general condition and stayed under ambulatory control that showed satisfactory, but delayed healing. We presume that such impaired healing process resulted from the type of the FB, its unknown residual time, possible child's maneuvers in the nasal cavity, as well as concomitant upper respiratory tract infection.

DISCUSSION

We conducted a literature review concerning the issue of NFB in pediatric population, and then analyzed.

The results of our analysis are summarized in table 1.

The mean age of patients affected by the problem was under 5 years old, in most cases around 3. Only one study noticed a significant contribution of patients with special needs or developmental disorders (12 out of 102 patients; 12.7%). The presence of this subpopulation increased with the mean age of patients and in the subgroup over 5 years of age accounted for 38.4% of all cases (10). There was no statistically significant difference in the sex, however male predominance was observed in 8 out of 12 studies (1, 4, 7, 9-13).

According to Abou-Elfadl et al. more than 70% of children were asymptomatic on admission (1) and even up to 86% in the study carried out by Chinski et al. (6). Depending on the study, a wide range, from 41 to 93%, of the incidents, were reported as witnessed by the childminder or self-reported by the child (4, 7, 8). However, the presence of an adult did not necessarily result in the faster removal of the NFB. In accordance with Regonne et al. 24 parents were aware of NFB incident, nonetheless only 10 of them referred to the emergency room within 24 hours (8). Considerable number of NFB was situated in the right nasal cavity, what is attributed to the fact that most children were right-handed. More than 90% of the NFB were found in the anterior part of the nasal cavity or between the inferior nasal concha and the septum (4, 13). The most frequently removed items were beads or bead-like rounded objects and vegetables (1, 2, 5, 7, 9, 14).

In our analysis of published articles between 0 to 18% of patients required NFB removal under general anesthesia. The most commonly reported reasons were lack of

Tab. 1. Comparison of findings in the reviewed studies

Author (Year)	Number of Patients	Mean Patient Age	Males	Females	Incidents Unwitnessed by Caretaker	Reported within 24 hours of Incident	Most Common Symptom	Right Nasal Cavity Location	Left Nasal Canal Location	Bilateral	Non-Organic FB	Organic FB	Batteries	Removal without General Anesthesia	Removal Under General Anesthesia	Septal Perforation
Glynn (2008)	44	5.26 (60%)	18 (40%)	6 (14%)	34 (77%)						37 (84%)	7 (16%)	3 (7%)	36 (82%)	8 (18.2%)	0
Lou (2019)	341	3.7 211 (61.9%)	130 (38.1%)	139 (40.8%)			Nasal obstruction	247 (72.4%)	83 (24.3%)	11 (3.3%)	201 (59%)	140 (41%)	9 (2.6%)	313 (91.8%)	28 (8.2%)	4
Chinski (2011)	1559	3.5 714 (45.8%)	845 (54.2%)	1449 (93%)			Cacosmia	860 (55.2%)	698 (44.8%)	2 (0.1%)	1133 (72.7%)	426 (27.3%)	1 (0.06%)	1487 (95.4%)	72 (4.6%)	
Cetinkaya (2015)	1870	3.33 989 (52.9%)	881 (47.1%)	131 (7%)			unilateral discharge	1151 (61.4%)	719 (38.3%)	5 (0.3%)	1186 (63.2%)	689 (36.7%)	10 (0.05%)	1627 (87%)	243 (13%)	2
Hira (2019)	1724	4.3 883 (51.3%)	841 (48.7%)	948 (55%)			Nasal obstruction	928 (53.8%)	78 (4.5%)	28 (1.6%)	1287 (74.7%)	437 (25.3%)	6 (0.3%)	1705 (99.1%)	15 (0.9%)	1
Regonne (2017)	58	3.33 27 (46.5%)	31 (53.5%)	34 (58.6%)	10 (17.24%)		Purulent rhinorrhea	43 (74.1%)	15 (25.9%)	0 (0%)	37 (63.8%)	21 (36.2%)	0 (0%)	49 (84.5%)	9 (15.5%)	0
Abou-Elfadl (2015)	260	3.153 (58.8%)	107 (41.2%)	61 (23.1%)			Purulent rhinorrhea			5 (1.9%)	214 (82.3%)	46 (17.7%)	2 (0.8%)	238 (91.5%)	22 (8.5%)	1
Ng (2017)	65	3.83 29 (45%)	36 (55%)	35 (54%)			Discharge						2 (3%)	61 (93.8%)	4 (6.2%)	
Pagella (2019)	106	3.09 50 (47.2%)	56 (52.8%)					58 (54.7%)	48 (45.3%)	0%				101 (95.3%)	5 (4.7%)	0
Scholes (2016)	102	3.9 56 (54.9%)	46 (45.1%)										13 (12.7%)	87 (85.3%)	15 (14.7%)	1
Van (2021)	668	3.21 349 (52.2%)	319 (47.8%)	71 (10.6%)	568 (85%)		Watery rhinorrhea	410 (61.4%)	248 (37.1%)	10 (1.5%)	481 (72%)	187 (28%)	20 (3%)	662 (99.1%)	6 (0.9%)	0
Francois (1998)	68	3.40 (58.8%)	28 (41.2%)	20 (29.4%)	48 (70.6%)		Unilateral discharge	46 (67.6%)	22 (33.4%)	2 (2.9%)	67 (93.1%)	5 (6.9%)	0 (0%)	68 (100%)	0 (0%)	0

cooperation and failure to remove during ENT consultation (3, 4, 11). According to the recent meta-analysis by Jungbauer et al. 6.23% patients required general anesthesia. They observed that NFB was successfully removed in 81.47% of cases treated in outpatient non-otorhinolaryngology clinics and in 95.56% in otolaryngology clinics. Most removals were performed with the use of micro-instruments, 1.25% used positive-pressure, other included irrigations and balloon catheter. Interestingly, only 1.09% of removals needed endoscopic assistance (15). Serious and long-standing complications occurred rarely with the most prevalent being epistaxis immediately after the evacuation (1, 4, 8). Standard recommendations after removal included ointments with antibiotics and saline nasal drops that facilitated local healing if needed and therefore reduced the risk of further complications (8).

Though button batteries were found rarely, they were associated with the most severe complications. Patients with inserted batteries more frequently developed ulcerations and septal perforations. Mucosal damage occurred within hours of insertion. Such patients were more likely to require removal in the operating theater under general anesthesia (4, 7, 9, 11). In our case, the observed tissue damage was typical for those caused by batteries. Interestingly, the retrieved object did not resemble metal item, it was disintegrating, more alike organic bodies. Endoscopic control proved no further particles of NFB, only massive inflammatory changes with granulomatosis and ulcerations.

According to the literature routine X-ray examination is not necessary (16), only 2-8.5% of all NFB required imaging, either X-ray or CT scan (1, 5, 13). Tong et al. performed radiological examination in 71 out of 147 cases, of which only 28 allowed identification of FB, which stands for 19% of all NFB in this study (17). Glynn et al. stated that plain radiograph may be beneficial for 18% patients (9). Radiograph should be considered in any case of primarily not visualized NFB, when insertion was unwitnessed to exclude metallic or magnetic NFB or when there is a suspicion of FB aspiration (16). Nowadays, a standard procedure with not or hardly visualized NFB should be fiberoscopy.

While it is important to stay alerted when the possibility of FB arises, unilateral rhinorrhea symptoms may occur in several other disorders. Differential diagnosis should include:

- anatomical abnormalities: deviated nasal septum, inferior turbinate hypertrophy, concha bullosa, choanal atresia,
- local inflammation: unilateral sinusitis, choanal polyps,
- pathological masses: neoplasm, rhinolith,
- trauma.

In presented case, due to delayed healing process with ulcerations and granulomatosis our patient was additionally investigated for granulomatosis with polyangiitis. Among pediatric population it is a rarely diagnosed autoimmune disease with the incidence of 0.1:100 000 (18). The mean onset of the disease is 11.6 years of age, however it ranges from 4 to 17 years old at time of diagnosis. About 70% of the patients are females. The most frequent manifestation involves ENT (about 82% of the cases) (19) which include septal perforation/saddle nose (16%), oral/nasal ulceration (50%), nasal discharge or recurrent epistaxis/crust/granulomata (73%), chronic sinusitis (61%) (18). Our patient's tests for ANCA and ANA antibodies were negative. Studies show that anti-PR3 antibodies are positive in 69% whereas anti-MPO antibodies are present in 21% of the cases (19). The GPA diagnosis is challenging, but it is necessary to exclude, as the mortality rate is high if untreated.

CONCLUSIONS

Nasal foreign bodies are frequently encountered among small children. They are typically associated with playing around the household and don't correlate with the developmental delay in children below 5 years of age. They should be suspected in every case of unilateral rhinorrhea. When witnessed by adults, it is recommended to consult with specialist (optimally with ENT specialist) without unnecessary delay and without unnecessary maneuvers that may further harden professional removal. We need to rule out any suspicions of metal or magnetic NFB, especially batteries. If such occurs, they must be removed promptly, as they enhance the risk of serious complications. Severe and chronic complications develop very rarely, but they do happen. It is also important to exclude tracheal aspiration, especially when NFB not identified during standard examinations. After removal saline nasal lavage and topical antibiotics should be considered to facilitate local healing.

CONFLICT OF INTEREST KONFLIKT INTERESÓW

None
Brak konfliktu interesów

REFERENCES/PIŚMIENNICTWO

1. Abou-Elfadl M, Horra A, Abada RL et al.: Nasal foreign bodies: Results of a study of 260 cases. *Eur Ann Otorhinolaryngol Head Neck Dis* 2015; 132(6): 343-346.
2. Bellocchi G, Acquaviva G, Giammona Indaco F, Eibenstein A: Foreign bodies in the pediatric age: the experience of an Italian tertiary care hospital. *Acta Biomed* 2020; 91(1-S): 60-64.
3. Endican S, Garap JP, Dubey SP: Ear, nose and throat foreign bodies in Melanesian children: an analysis of 1037 cases. *Int J Pediatr Otorhinolaryngol* 2006; 70(9): 1539-1545.

CORRESPONDENCE
ADRES DO KORESPONDENCJI

*Lidia Zawadzka-Głós
Klinika Otolaryngologii Dziecięcej
Warszawski Uniwersytet Medyczny
ul. Żwirki i Wigury 63A
02-091 Warszawa
tel.: +48 (22) 317-97-21
laryngologia.dsk@uckwum.pl

4. Hira İ, Tofar M, Bayram A et al.: Childhood Nasal Foreign Bodies: Analysis of 1724 Cases. *Turk Arch Otorhinolaryngol* 2019; 57(4): 187-190.
5. Dann L, Doody J, Howard R et al.: Nasal foreign bodies in the paediatric emergency department. *Ir J Med Sci* 2019; 188(4): 1401-1405.
6. Chinski A, Foltran F, Gregori D et al.: Nasal foreign bodies: the experience of the Buenos Aires pediatric otolaryngology clinic. *Pediatr Int* 2011; 53(1): 90-93.
7. Cetinkaya EA, Arslan İB, Cukurova İ: Nasal foreign bodies in children: Types, locations, complications and removal. *Int J Pediatr Otorhinolaryngol* 2015; 79(11): 1881-1885.
8. Regonne PE, Ndiaye M, Sy A et al.: Nasal foreign bodies in children in a pediatric hospital in Senegal: A three-year assessment. *Eur Ann Otorhinolaryngol Head Neck Dis* 2017; 134(5): 361-364.
9. 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(4): 217-218.
10. Scholes MA, Jensen EL: Presentation and management of nasal foreign bodies at a tertiary children's hospital in an American metro area. *Int J Pediatr Otorhinolaryngol* 2016; 88: 190-193.
11. Yan S, Zeng N, Chen G et al.: Presentation and management of nasal foreign bodies in a Chinese metro area. *Medicine (Baltimore)* 2021; 100(16): e25626.
12. Francois M, Hamrioui R, Narcy P: Nasal foreign bodies in children. *Eur Arch Otorhinolaryngol* 1998; 255(3): 132-134.
13. Lou ZC: Analysis of nasal foreign bodies in 341 children. *J Laryngol Otol* 2019; 133(10): 908-912.
14. Pagella F, Pusateri A, Matti E et al.: Nasal foreign bodies management in children: Our experience in 106 patients. *Clin Otolaryngol* 2019; 44(4): 660-663.
15. Jungbauer WN Jr, Shih M, Nguyen SA, Clemmens CS: Comparison of pediatric nasal foreign body removal by care setting: A systematic review and meta-analysis. *Int J Pediatr Otorhinolaryngol* 2022; 158: 111162.
16. Oh H, Min HJ, Yang HS, Kim KS: Is Radiologic Evaluation Necessary to Find out Foreign Bodies in Nasal Cavity? *J Craniofac Surg* 2016; 27(1): e62-64.
17. Tong MC, Ying SY, van Hasselt CA: Nasal foreign bodies in children. *Int J Pediatr Otorhinolaryngol* 1996; 35(3): 207-211.
18. Bohm M, Gonzalez Fernandez MI, Ozen S et al.: Clinical features of childhood granulomatosis with polyangiitis (wegener's granulomatosis). *Pediatr Rheumatol Online J* 2014; 12: 18.
19. Iudici M, Quartier P, Terrier B et al.: Childhood-onset granulomatosis with polyangiitis and microscopic polyangiitis: systematic review and meta-analysis. *Orphanet J Rare Dis* 2016; 11(1): 141.

submitted/nadesłano:

4.07.2022

accepted/zaakceptowano do druku:

25.07.2022