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REVIEW ARTICLE

Nasal foreign bodies in children: considerations for the anesthesiologist

Jeffrey S. Yasny

Department of Anesthesiology, The Mount Sinai School of Medicine, New York, NY, USA

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Correspondence
Jeffrey S. Yasny,
Assistant Professor of Anesthesiology,
Department of Anesthesiology, The Mount Sinai School of Medicine, PO Box 1010,
One Gustave L. Levy Place, New York, NY 10029-6574, USA
Email: jeffrey.yasny@mountsinai.org

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Summary

The combination of a curious young child exploring his/her nasal cavities, with the abundance of small inert and natural objects in our society, culminates in a significant number of nasal foreign bodies (NFBs). Usually NFBs are benign entities, yielding relatively simple resolutions and mild morbidities. However, their presence can lead to much more serious consequences if they are inserted unwitnessed, grow asymptomatically for several months or years, and significantly affect surrounding tissues. Moreover, if these substances become displaced posteriorly and enter the lower respiratory tract, dire circumstances may occur. This article discusses the different types of NFBs, various clinical presentations, diagnosis, pathophysiology, and pertinent considerations for the anesthesia care provider. Increasing one's awareness of the implications of NFBs, can optimize the safe treatment of patients harboring this development.

The curiosity of a child who explores his/her nasal cavities, coupled with the plethora of tiny inert and natural objects in our society, can produce a dangerous outcome. Nasal foreign bodies (NFBs) have the potential to yield significant morbidity (1). This article discusses the different types of NFBs, various clinical presentations, diagnosis, pathophysiology, and pertinent considerations for the anesthesia care provider who may encounter such an incident.

Presentation

Nasal foreign bodies can be situated in any portion of the nasal cavity. Usually they are found around the floor of the nose just below the inferior turbinate. Another common location is immediately anterior to the middle turbinate. Children's tendencies to explore their bodies make them inclined to lodge foreign bodies in their nasal cavities. They may also insert foreign bodies to relieve preexisting nasal mucosal irritation or epistaxis (2). Despite being frequently discovered in the pediatric population, NFBs can also be found in adults, especially those with mental retardation or a psychiatric illness (3).

One study examined 420 cases of NFBs removed in the ENT service of a hospital (4). Fifty-three percent of NFBs occurred in the first 2 years of life, with another 39% between the ages of 2 and 4 years. Unilateral foreign bodies were found to affect the right side about twice as often compared with the left. This finding may be because of a greater occurrence of right-handed people in the general population and a preference of these individuals to insert objects in their right naris (4). Two studies found that men comprise a greater incidence of individuals presenting with NFBs (56–58%) vs women (42–44%) (5,6).

The majority of NFBs are inanimate objects, categorized as either inorganic or organic. Inorganic objects typically consist of metal or plastic. Examples include small parts from toys, beads, and jewelry. Often they become imbedded in calcareous concretion, remaining asymptomatic and unnoticed for weeks or months (7). Organic NFBs, include items such as food, rubber, wood, or a sponge, tend to be more irritating to the nasal mucosa than inorganic objects. Because organic NFBs absorb water from the local tissues, a brisk inflammatory reaction ensues, culminating in an earlier symptomatic presentation than inorganic NFBs

(8). In tropical climates and unhygienic environments, animate objects such as larvae and worms can occasionally inhabit the nasal cavities, but are rare in most civilized centers (9).

Diagnosis

In most cases, the insertion of a NFB is a witnessed event, eliminating the diagnostic dilemma. However, in 30% of the cases, the insertion is not witnessed and not reported by the child who may be afraid to inform anyone. Often, the NFB becomes diagnosed following the occurrence of symptoms (10,11). The most common signs and symptoms include a unilateral mucopurulent nasal discharge with a foul odor, epistaxis, and nasal vestibulitis (12). Obtaining a thorough history from the patient and his or her primary guardian is important. If the correct diagnosis is missed initially, the foreign body may not be detected for days, weeks, or even years. In one study, presentations over 48 h after the time of insertion accounted for 14% of all cases (11).

Unlike foreign bodies in the ear, NFBs fail to be recognized for longer periods of time because they usually produce fewer symptoms and are more difficult to visualize. One case report described a patient who at the age of 5 or 6 years introduced a foreign body into his right nasal cavity. It remained there until the age of 37. Following his presentation with symptoms of a strong fetid smell for 4 years and difficulty breathing through his right nostril for 10 years, it was removed under general anesthesia (13). Moreover, all NFBs possess the potential for being swallowed by the patient or being dislodged into the airway if displaced posteriorly (10).

Clinicians must entertain the diagnosis of a NFB in all patients with nasal irritation, sinusitis, stridor, wheezing, or fever. Some authors have reported discovering NFBs as the etiology of more unusual patient presentations such as irritability, epistaxis, sneezing, snoring, halitosis, facial cellulitis, epiglottitis (14), or obstructive sleep apnea (15). For most isolated NFBs, no diagnostic testing is indicated. With the exception of metallic or calcified objects, most NFBs are radiolucent.

Pathophysiology

Provided that the endonasal mucosa is intact, any tiny particles that may enter the nose during inspiration are eliminated through the secretion of mucus and ciliary action. If the mucosa is damaged, such particles may remain in the nasal cavity and grow in size through accretion of mineral salts and incrustation (16). Vomit may enter the nose via the choana, remain there, and form a foreign body. NFBs commonly cause tissue damage to the nasal cavity and the surrounding structures. Initially, they may produce local inflammation that can generate a pressure necrosis, which in turn can lead to mucosal ulceration and erosion into blood vessels, producing epistaxis. Occasionally, for the parent or guardian, a child's epistaxis is of unknown origin and remains a mysterious symptom for months without the true cause being identified.

A rhinolith is an undetected, impacted foreign body in the nasal cavity that becomes mineralized, coated with calcium, magnesium, phosphate, or carbonate. Trauma, surgical operations, dental treatment, nasal packing material, and plugs of ointment may also promote the development of a rhinolith. As the rhinolith increases in size, the symptoms arising can include the following: unilateral nasal discharge, unilateral purulent rhinitis with or without consecutive sinusitis, facial pain, headache, epistaxis, impairment of nasal breathing ending in complete obstruction, dacryocystitis, otorrhea, foetor, anosmia, palatal perforation, or septal perforation (17,18).

Some inorganic objects can become more destructive than others when lodged inside the nose. For example, button batteries, found in many small electronic devices and toys, can cause nasal cavity burns within a few hours (19). These objects are composed of various types of heavy metals: mercury, zinc, silver, nickel, cadmium, and lithium. Local tissue damage is caused by low-voltage electrical currents, electrolysis-induced release of sodium hydroxide and chloride gas, and liquefactive necrosis if alkaline contents leak out. As a result, they can cause septal perforations, synechiae, constriction, and stenosis of the nasal cavity (16).

Unexpected NFBs

Prior to a young child entering the operating room, the presence or absence of a foreign body in the nasal cavity and surrounding structures is usually well established. However, following the induction of anesthesia for an unrelated procedure, the existence of an asymptomatic NFB may become an unexpected finding for the anesthesia care provider. For example, during a dental procedure that necessitated a nasotracheal intubation, immediately preceding the advancement of the tip of the endotracheal tube (ETT) through the vocal cords, a calculator key was discovered resting on the dorsal porion of the vocal cords. It was cautiously retrieved with Magill forceps (20).

During a nasal intubation, one suggestion for minimizing the dislodgement of an asymptomatic NFB by

an ETT toward the vocal cords is to use a suction catheter as an obturator. Pirotte *et al*. describe the employment of a close-fitting suction catheter [diameter in Fr $\sim$ (ETT ID $\times$ 3) $-$ 2] lubricated with silicone spray and inserted into the ETT together through the nose and carefully slipped into the posterior pharynx. The suction catheter, withdrawn from the ETT before passage through the glottis, acts as pathfinder in the nasal cavity and avoids clogging the ETT with mucous, blood, adenoidal tissue, a piece of turbinate, or an unknown foreign body. Also, the catheter can suction a foreign body in a cephalad direction and prevent it from being pushed caudally (21). Questioning a parent or guardian whether the child has had any abnormal, unexplained nasal symptoms such as epistaxis can help minimize the unexpected discovery of an NFB following the induction of anesthesia.

Conclusions

Nasal foreign bodies are especially popular for insertion into the nares of children under the age of 4 years. These objects are classified as either inorganic substances, such as tiny metal or plastic components of toys or electronic devices, beads or jewelry, or organic matter such as rubber or small foods like seeds and nuts. Usually NFBs are benign entities, yielding relatively simple resolutions and mild morbidities. However, their presence can lead to much more serious consequences if they are inserted unwitnessed, become rhinoliths, grow silently, and eventually become symptomatic as they affect surrounding tissues. If the initial diagnosis is missed, they can develop silently for several months or years. Moreover, if dislodged and displaced posteriorly entering the lower respiratory tract, dire consequences can occur. Undiagnosed NFBs can present with unusual or intermittent symptoms and unexpectedly become visible following induction of anesthesia. Increasing an anesthesia care provider's awareness of the significant implications of NFBs can optimize safe management of this condition.

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