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Original article

# Nasal foreign bodies: Results of a study of 260 cases

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ABSTRACT

*Aims:* Insertion of a foreign body in the nasal cavity is a very common incident in children. It is easily diagnosed, but the type of foreign body varies and extraction can sometimes be difficult, with risk of complications. The present study reports nasal foreign bodies seen in emergency in our ENT department, with an update on the state of knowledge.
*Materials and methods:* A prospective study between May and August 2011 included all patients admitted to the ENT emergency unit for nasal foreign body. Data comprised age, gender, circumstances of discovery, symptoms, type of foreign body, extraction method and complications.
*Results:* Two hundred and sixty cases of nasal foreign body were included, representing 4.3% of all consultations in the unit. Mean age was 3 years (range: 1–16 years); the sex ratio was 1.4 (male predominance). The incident was reported by a family member or the actual child in 76.9% of cases ($n = 199$), or discovered following nasal symptoms in 23.1% ($n = 61$). The main types of foreign body were non-organic synthetic beads in 18.8% of cases and vegetable forms in 17.7%. Extraction was easy, using forceps, micro-hooks or suction, in 91.53% of cases. Complications comprised infection ($n = 48$), epistaxis ($n = 18$) and nasal septum perforation ($n = 1$).
*Conclusion:* Nasal foreign bodies are a frequent accident in medical practice, especially in young children. They are generally harmless, but may incur complications if overlooked or when a button cell is involved, whence the importance of timely extraction. The best treatment, however, remains prevention.


## 1. Introduction

Nasal foreign bodies are frequently encountered, especially in children. The circumstances are usually accidental, with a foreign body trapped or incarcerated in one or both nasal cavities by the anterior (vestibular) or more rarely posterior (choanal) route [1].

Positive diagnosis is often easy, but may be delayed by the context, type of foreign body or non-specificity of the symptomatology. Early diagnosis can avoid potentially serious complications related to the nature of the foreign body itself or to chronicization of the resultant irritation, with a real risk of superinfection.

The present study reports epidemiological, clinical and therapeutic aspects of nasal foreign bodies in a series of 26 cases.

## 2. Materials and methods

A prospective study performed between May and August 2011 in the ENT emergency unit of the 20-Août Hospital in Casablanca (Morocco) included 260 nasal foreign body patients, admitted throughout the day and night and receiving immediate treatment.

Study variables comprised age, gender, particular context, circumstances of discovery, symptoms, type of foreign body, means of extraction and any complications.

## 3. Results

Six thousand and forty-five patients consulted in the ENT emergency unit during the 4-month study period, including 780 cases of ENT foreign body, located in the nasal fossae (260), ear (313) or esophagus (207). Nasal foreign bodies accounted or 4.3% of consultations and for 33.3% of ENT foreign bodies. Table 1 presents the distribution of ENT foreign bodies for the period May–August 2011.

Median age was 3 years (range: 12 months to 16 years; mean: 3 years). Fig. 1 shows distribution by age group.

The sex ratio was 1.4: 58.8% male and 41.2% female.

The incident was reported by a family member or the actual child in 76.9% of cases ($n = 199$), and or discovered following nasal symptoms in 23.1% ($n = 61$).

Most of the children (74.6%, $n = 194$) were asymptomatic at admission. In the other cases, symptoms comprised purulent

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**Table 1**
Distribution of foreign bodies in the ENT region (May–August 2011).

| Type of foreign body | Number | Percentage of total number of foreign bodies | Percentage of total number of consultations |
|---|---|---|---|
| Nasal cavities | **260** | **33.33** | **4.3** |
| Ear | 313 | 40.12 | 5.17 |
| Esophagus | 207 | 26.58 | 3.42 |
| Total | 780 | 100 | 100 (6045) |

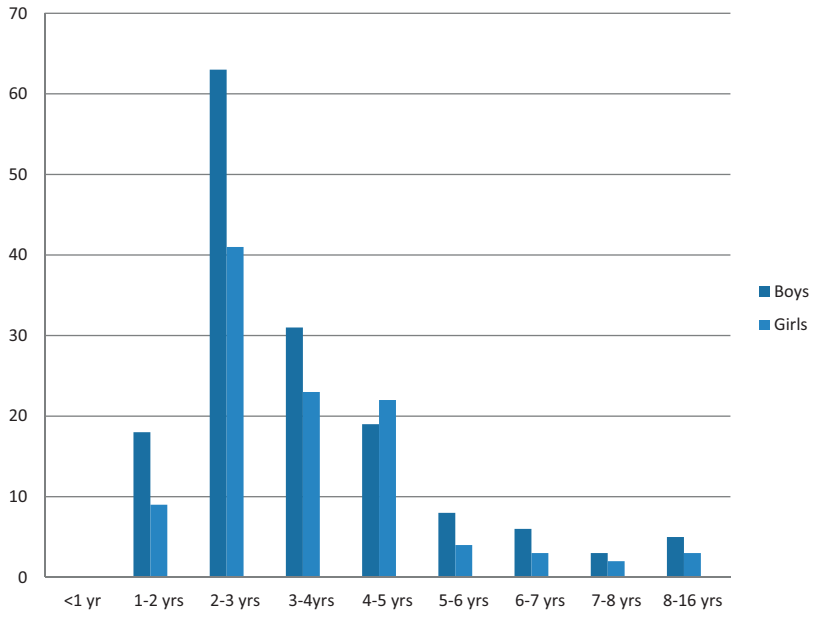


**Fig. 1.** Number of cases according to age and gender.

rhinorrhea associated with unpleasant nasal odor in 18.46% of cases ($n = 48$) and epistaxis in 6.9% ($n = 18$).

There was 1 case of Down's syndrome, in a 16-year-old child, but no cases of mental retardation.

Examination locates the foreign body, which can be identified by pushing the tip of the nose back with a finger; otherwise, effective anterior rhinoscopy can be performed using an otoscope.

The foreign body is usually found in the antero-inferior part of the cavity, trapped by the inferior turbinate. More rarely, it may be found more posteriorly or superiorly, pushed back by previous attempts at extraction.

In 5 cases, foreign bodies of the same type were found in both nasal cavities; there was 1 case of nasal and auricular foreign bodies.

The present series predominantly involved non-organic foreign bodies (beads in 18.8% of cases) and vegetable types. Button cells, which are especially toxic, were implicated in 0.76% of cases.

Table 2 shows distribution by type.

Nasopharyngeal X-ray was performed in 5 cases involving fetid purulent rhinorrhea in which the incident of introduction of the foreign body was unknown and anterior rhinoscopy was non-contributive.

Extraction was performed in the ENT emergency unit. The child was immobilized on one of the parents' knees. The foreign body was visualized and the location, form and presentation were analyzed, and extraction was achieved using micro-instruments (forceps or micro-hook) or aspiration in 91.53% of cases ($n = 238$). The 2 cases of button cells were extracted by microforceps.

Sedation and extraction using a 0° optic was necessary in 8.46% of cases ($n = 22$), including 1 case involving a button cell.

Outcome was favorable in most cases. In 18 cases (6.9%), there was slight epistaxis, with spontaneous resolution not requiring any packing. There was 1 case of asymptomatic 7-mm antero-inferior septal perforation, discovered on extraction of a button cell by 0° endoscopy under sedation, not requiring specific treatment. Local infection in the form of purulent rhinorrhea with fever occurred in 48 cases (18.46%), requiring treatment by nasal cavity lavage with physiological saline or local antiseptics associated to 12 days' antibiotics (amoxicillin-clavulanic acid). There was no recurrence.

**Table 2**
Distribution according to type of foreign body.

| Type of foreign body | Number | Percentage |
|---|---|---|
| Bead | 49 | **18.8** |
| Vegetable | 46 | 17.7 |
| Plastic | 37 | 14.2 |
| Sponge | 36 | 13.8 |
| Chalk | 26 | 10 |
| Paper | 22 | 8.4 |
| Cotton-wool | 21 | 8.07 |
| Metal | 14 | 5.38 |
| Stone | 7 | 2.7 |
| Button cell | 2 | 0.76 |

## 4. Discussion

The few publications on nasal foreign bodies concern limited periods ranging from 6 months to 5 years [1]. In 2010, Kharoubi reported 700 cases in Algeria; in 2004, Brown et al. reported 138 cases; in 2008, Gregori et al. published a European series of 688 cases; and in 2006, Figueiredo et al. reported 420 cases seen in pediatric emergency [2].

None of these studies estimated the frequency of nasal foreign bodies within the specialized structures concerned (pediatrics, ENT, emergency), except for the Algerian study, in which they accounted for 3.9% of ENT emergency consultations and 27.2% of

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upper-airway foreign bodies over the period 1993–2003; analysis of ENT distribution showed nasal foreign bodies in second place, with 1313 esophageal locations, 700 nasal, 320 auricular and 240 bronchial: i.e., 1 bronchial for 1.3 auricular, 3 nasal and 5 esophageal foreign bodies.

In the present series, nasal foreign bodies accounted for 4.3% of ENT emergency consultations and 33.3% of ENT foreign bodies; once again, nasal locations were in second place: 207 esophageal, 260 nasal and 313 auricular locations: i.e., 1 esophageal for 1.2 nasal and 1.5 auricular foreign bodies (Table 1).

Accidents are often domestic, occurring during a game or meal; the type of object depends on those present in the child's immediate environment [1,2]. Only 38% of cases occur in the presence of an adult [3]; otherwise, either the child reports the incident spontaneously or else the parents discover it in the course of washing or providing other care; in other cases, it is discovered incidentally during exploration of a complication (purulent rhinorrhea, unpleasant odor, epistaxis, nasal obstruction or nasal discomfort leading to mouth breathing).

Age is most commonly around 3 years in most studies; Kharoubi reported a mean age of 4.3 years [1].

In the present series, 80% of the children were aged between 2 and 5 years, ages younger than 2 and older than 6 years being unusual. This age distribution corresponds to psychomotor development (prehension, thumb-index opposition).

The sex ratio shows male predominance (58.8% in the present series) in most reports.

The types of nasal foreign body are broadly comparable between reports, differences being mainly in proportions.

In the present series, 18.8% were synthetic beads, with vegetable varieties (beans, sunflower seeds, maize, fruit pips, peanuts, etc.) in second place.

Button cells were relatively rare in the present series (0.76%), and there were no living foreign bodies.

In the literature, most nasal foreign bodies (NFB) are non-organic compounds (NOC), which account for 72–80% of extracted objects [1,4]. The most frequent NOCs are plastic beads or balls (9–31%), fragments of plastic or of toys (9–18%), pieces of foam-rubber (7–23%), pebbles or gravel (7–14%), paper (4–7%) and cotton-wool (2–10%). Organic compounds (OC) are less frequent.

Lesions induced by nasal foreign bodies vary according to the type of body and the duration of its presence: edema of the mucosa of the nasal cavity (irritation, inflammation) followed by superinfection with nasal suppuration, mucosal bleeding (ulceration, hyperemia) and granulation tissue formation (granulomatous foreign body reaction).

Button cells are a special case, being particularly dangerous and able to cause serious lesions. The intensity and type of lesion depends on the type (size and chemical composition), number (1 or more) and especially duration of presence of the battery cell(s). Mucosal ulceration is virtually systematic; severe lesions may follow: septal perforation by cartilage necrosis, necrosis of the inferior turbinate and inferior meatus, and vestibular rhinitis. Button cells act via 3 mechanisms: mechanical pressure (contact with endonasal structures and pressure-induced necrosis), chemical (chemical components of the cell) and electrical (current between anode and cathode crossing the endonasal structures) [5].

Clinically, presenting symptoms depend on the type and duration of presence of the foreign body and the circumstances of the accident. Usually, someone is aware of the incident and the child is brought in consultation for nasal foreign body. If it is overlooked or neglected, it induces symptoms: recurrent unilateral rhinorrhea resistant to treatment, cacosmia, epistaxis, nasal obstruction or facial pain. More rarely, there may be regional infection: sinusitis, orbital cellulitis, nasal furuncle or staphylococcal infection of the face [1].

In other cases, discovery is incidental to X-ray (dental or facial). In one case, a nasal foreign body was detected during nasal intubation [1].

For nasal cavity examination, the child is immobilized on one of the parents' knees and the head is held in one hand. A large-caliber ear speculum is used for endonasal examination, visualizing the foreign body and determining type and location. It is usually found on the cavity floor, against the septum, behind the head of the inferior turbinate. Depth inside the cavity depends on the object's form, volume and type (partial degradation and decomposition) and possible associated abnormalities (septal deviation, chondro-vomeral dislocation, turbinate hypertrophy). The smaller and thinner the foreign body, the more posterior the location. Mucopurulent secretions are often associated, requiring aspiration. Examination also detects any local lesions such as hemorrhagic ulceration, nasal mucosal necrosis or septal perforation by overlooked or toxic (e.g., button cell) bodies.

Radiologic assessment is performed if clinical examination is difficult or inconclusive.

The nasal foreign body may be expelled spontaneously by sneezing, if not, certain complications are reported (in 9.5% of cases according to Figueiredo et al.): superinfection, facial cellulitis, vestibular rhinitis, recurrent epistaxis, septal perforation and inferior turbinate necrosis (button cell), sleep apnea, septicemia, tetanus, or rhinolithiasis by accumulation of calcium salts [4].

Nasal foreign bodies, when diagnosed, must be extracted. Two categories of technique may be distinguished: non-instrumental and instrumental maneuvers [2].

The former should be attempted first whenever possible. If the foreign body is visible in the vestibule or is under the inferior turbinate, blowing the nose may be effective, limited only by the child's age and acquisition of the gesture. In older children, forced expiration with the mouth closed is equivalent. Positive-pressure techniques are useful, and under-used: for the "parent's kiss", the child is seated, reassured and told he or she will be getting a big kiss from one of the parents: the free nostril is blocked and the parent blows suddenly into the child's mouth; the success rate exceeds 60%, and the maneuver is especially effective if the foreign body has been in position for less than 12 hours [2].

Insufflation using an AmbuW balloon has been reported; cooperation is, however, subject to the child's acceptance of the mask [6]. Likewise, a tube delivering 15 l/min oxygen to the free nostril, with the mouth closed, was reported to be effective [2]. The risk of positive-pressure techniques inducing barotrauma to the tympanic membrane exists in theory but has not been reported.

There are numerous instrumental maneuvers, depending on the type and form of the foreign body, the child's cooperation and the operator's experience.

To maximize the chances of success, it is important to visualize the foreign body properly; vasoconstrictors and local anesthetics, if not contraindicated, may be helpful. Techniques include use of forceps or hooks, catheters or balloon probes, aspiration, lavage or even glue [7,8].

Forceps and hooks are indicated when the foreign body is solid and located anteriorly in the vestibule; the risk is of breaking up crumbly bodies, leaving some behind or even allowing them to migrate, with risk of inhalation. Hooked instruments may damage the mucosa, leading to epistaxis [7]. Balloon probes or catheters (Foley No. 5, 6 or 8 or Fogarty) are suitable for smooth, round bodies. The instrument is lubricated and introduced in the nostril beyond the foreign body; once the balloon has been inflated, the probe is gently withdrawn, and the foreign body with it [7,8]. Adjusting balloon volume can help in mobilizing the foreign body [7]. Complications are rare, often limited to epistaxis. Aspiration is recommended for large, smooth, round bodies, where the surfaces will provider adherence, the only risk being of pushing the

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foreign body further back by faulty maneuver [7,8]. Lavage with physiological saline is a possibility for crumbly bodies, but is strictly contraindicated for button cells, due to the risk of electrolysis, and in young children, due to the risk of inhalation or reflux of nasal secretions toward the Eustachian tube and sinuses [7]. Cyanoacrylate glue, as used in skin suture, has been reported [7,8]: it is applied to the tip of a plastic stem which is carefully introduced in the nostril and held in contact with the object for about 1 minute before being withdrawn.

Living nasal foreign bodies (larvae, worms or insects) should be anesthetized ahead of extraction [7], using saline solution or xylocaine spray; the latter both paralyzes the creature and provides local anesthesia.

In difficult cases, general anesthesia under intubation or sedation may be performed for microscopy and endonasal endoscopy.

Antibiotherapy using amoxicillin-clavulanic acid at 80–90 mg/kg/day for 8–10 days and local treatment are indicated for complicated cases and button cells.

## 5. Conclusion

Nasal foreign bodies are an accident frequently encountered in medical practice, especially in young children (2–4 years of age). They arise from the child's interaction with the environment. The accident is generally known to the family, so that treatment is not delayed and sequelae and complications are minimized. Some cases, however, are serious and require emergency extraction. Extraction techniques vary with the kind of object. The contralateral cavity and the ears should also always be examined. The best treatment remains prevention.

## Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

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