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NASAL FOREIGN BODIES IN CHILDREN

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Abstract. Nasal foreign bodies are common in young children. Nostril openings are available for exploration. Nasal secretion facilitates penetration of foreign bodies into the nose. Consequently, the nasal valve prevents their removal. Extraction requires specific tools and skills. From one point of view, the chemical structure could be organic or mineral. Also, one should evaluate the size, shape, retention time, brutal manoeuvres of extraction with secondary pituitary mucosa injury (superficial or deep). All these matters influence the long term evolution and the quality of life.
Keywords: nasal foreign body, pituitary mucosa injury, child

Nasal foreign bodies are common in young children. Nasal openings are accessible for exploration. Nasal secretion facilitates penetration of foreign bodies into the nose. Then, the nasal valve prevents their removal. The extraction requires specific tools and skills [1].

The article was inspired by our personal casuistry with nasal foreign bodies seen at the emergency room of Emergency Hospital for Children "Grigore Alexandrescu", Bucharest and in elderly patients with sequelae after nasal foreign bodies, admitted at the National Institute of Gerontology and Geriatrics ,,Ana Aslan ", Bucharest.

Because the curiosity in exploring the surrounding environment is natural in children, they discover the role of nasal breathing by introducing various foreign bodies inside their nose. Fear o not breathing makes them recognize what they have done which makes their parents bring them to the hospital. Others have fear of being punished so they do not admit their fault which causes a late presentation an the emergency room, often with complications. Finally, some children with minor functional impairment reach maturity with nasal obstruction syndrome sequelae [1,2].

Nasal foreign bodies are easily inserted into the nasal fossa and the extraction could be difficult. They move posteriorly due to the excess of nasal mucus which is characteristic in children.

Parents panic immediately and try to give them first aid with ear-sticks, needles or tweezers. All these improper trials lead to pituitary mucosa damage, nasal hemorrhage and migration of the foreign body to the posterior nose [3].

Etiology and pathology

There are few particular objects which usually block the nose in such cases:

- Battery;
- Seeds;
- Small metallic objects;
- Fabric;
- Toys.

Nasal respiratory mucosa is lining the walls, except for the olfactory area. It continues into the sinuses, as well as in the nasopharyngeal region [2,3].

Nasal vestibule is in direct contact with the external environment through the skin tissue: multilayered epithelium, keratinized and covered with scales. It has sweat glands, sebaceous glands and fine hairs called "vibrizes". Once passed limen nasi, skin loses its keratin and gradually turns into the lining. The atrium with scaly epithelium is found in the back and shows microvilosities by variable length, usually short, characteristic for a transitional epithelium. Middle and inferior turbinates are covered by respiratory

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epithelium, ciliated cylindrical pseudolayers, whose cilia vibratile is a characteristic structure. The transition between olfactory and respiratory mucosa is brutal [3].

The total area of the nasal mucosa is about 140-170 cm^2 with a variable width of 20 to 30 μm, while the mucosal surface for smell is only 2 cm^2. It consists in a thicker epithelium, around 60-70 μm [3].

Nasal cavity is divided into two nasal passages by a median wall with a bone structure posteriorly and superiorly and a cartilaginous part, anteriorly and inferiorly. It communicates with the outside through nostrils and pharynx and is continuous with the nasopharynx. Nasal cavity is divided into 3 zones: vestibule, olfactory portion and respiratory portion. The respiratory mucosa consists in cylindrical ciliated multilayered epithelium, hair cells present at the apical pole that orient cilia to beat from back to front and mucus-secreting goblet cells – cells with the form of a glass stemware. The more dilated apical pole contains particles that remove surface mucus lining, which will help retain foreign particles. The brush border cells present an apical pole with microvilli and a basal pole that establishes synaptic contacts with nerve fibbers and acts as a receptor [3].

The cells with small granules are part of the diffuse endocrine system and provide endocrine function of the lung. Young basal cell ensures regeneration of all cell types. Chorionic consists in connecting vessels and nerves and tubulo-acynes with secretory glands [3].

The nasal cavity is examined through anterior rhinoscopy.

The nasal cavity is flattened in the sagittal plane. The internal wall, septum, and the median plan present in the anterior and inferior portions richly vascularized areas with shallow and fragile vessels - vascular stain of Kiesselbach. The ower wall is levelled and smooth. The narrow anterior wall is practically reduced to a ditch arising from the inner wall of the external union. The upper wall is also narrow - olfactory groove - corresponding at this level to ethmoidal riddled blade and having a yellowish mucosa, which presents olfactory receptors. The rear wall portion has a high body corresponding to sphenoid bone, sphenoid sinus orifice which opens a lower portion that communicates with the pharynx - choanal opening. The external wall is anfractuos and presents the nasal cornets [3].

Batteries

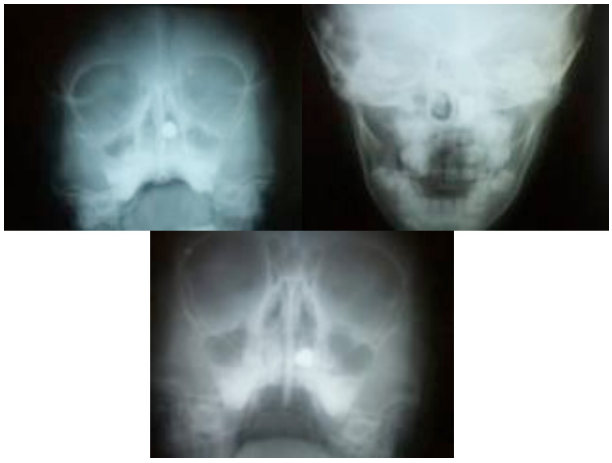

Fig.1. Radiopaque foreign body in the left nasal fossa on the skull radiographs (personal collection)

Batteries are cited more frequently in paediatric pathology, over 66% of cases being described in children under 6 years (with a maximum peak incidence between the age of 1-2 years). It should also be noted that 10% of cases occur in people aged 60-90 years [1,2].

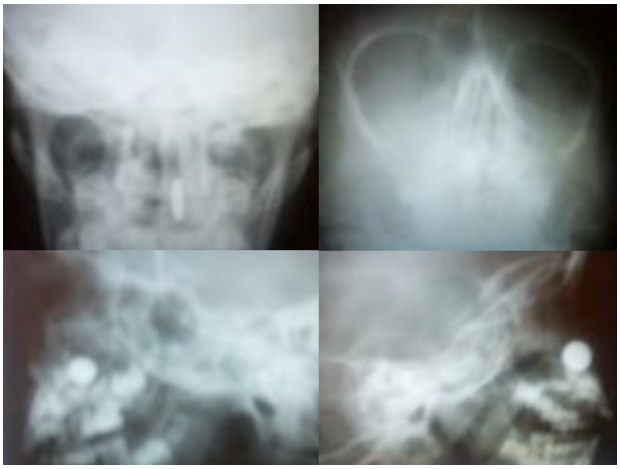

Fig.2. Radiopaque foreign body images on the lateral skull radiographs (personal collection)

Chemical analysis shows that these batteries contain mercury, zinc, lithium, copper, silver, sodium and potassium hydroxide. In contact with the pituitary mucosa these substances, especially sodium hydroxide, display a caustic effect. Immediately, an inflammatory reaction occurs. The glands from the superficial epithelial layer are secreting a glycoprotein called mucin. The secretion contains also bicarbonate, chloride and water. However, ciliary layer cannot remove the battery that is in contact with mucosa. On short term, this will lead to suppurative lesions of the nasal septum and walls, with fetid secretion. On long term this will lead to turbinate synechiae. The clinical expression will be with nasal obstruction, hyposmia and snorring. Other complications can occur too: unilateral weakness, rhinitis (epithelial layer is damaged by chemical burn), perforation of nasal septum, chronic sinusitis. Regarding the latter, the most commonly affected is the maxillary sinus and the ethmoidal cells. Frontal and sphenoidal sinuses usually are not affected [1,2,3].

Textiles

Impairment of ventilation in the nasal cavity and paranasal sinuses promotes conditions for exacerbation of saprophytic flora, leading to suppurations with permanent unilateral nasal obstruction. First the respiratory discomfort is mild, without local pain or nose bleeding. The smell of the fabric is detected often in an advanced state of decay. It is curious that this entity does not complicate with satellite sinusitis, instead it turns downward with tracheobronchitis, which can be complicated by recurrent pneumonia. Therefore, this etiologic diagnosis is sometimes established after 1 year, when the patient is examined by an ENT doctor because the pulmonologist requests this. After removal of the foreign body, there remains a wide nasal fossa, with pale pituitary mucosa and fetid secretions caused by anaerobic bacteria that require prolonged therapeutic care [1,3].

Sometimes, adults and elderly remember such episodes in their history.

Seeds

Most frequently involved seeds are: bean, sunflower and peanuts. They germinate, increase their volume and determine complete nasal obstruction with consequently unpleasant unilateral nasal secretions and headache. Aspiration of seeds is common in children and adults with mental illness [2,3].

Their extraction is difficult if the doctor is seen when the seed is not wide anymore. If someone from the entourage tries extract the seed, there is the risk that it will slip into pharynx and furthermore into the upper airways, leading to dramatic evolution. On the other hand, if the seed remains in place, it expands and stays in the nasal fossa without being life threatening [3].

Toys

Toys are preferred by small toddlers aged 2-3 years old. They are not seen in adults or elderly. Children are attracted by small objects with regular shapes, brightly coloured or with a shiny surface. These objects are subject of the lowest level of aggression on the pituitary mucosa [1].

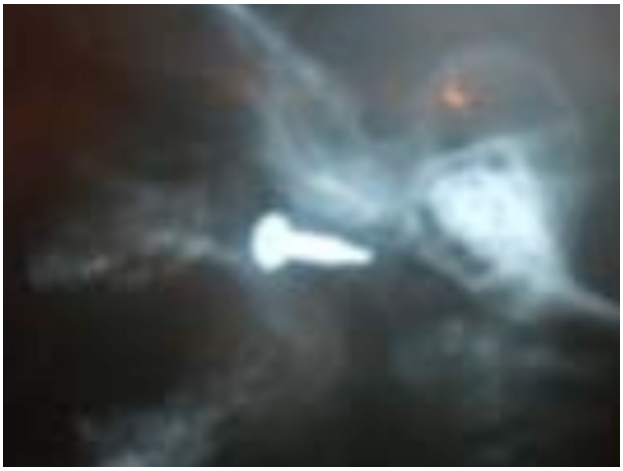

Fig.3. Radiopaque foreign body (metallic object) in the nasal fossa on the lateral sull radiography (personal collection)

Treatment

The treatment is more difficult for foreign bodies blocking the area for a longer period of time. It can be administered without anaesthesia or under local or general anaesthesia. Important matters are the size and position of the foreign body, as well as the patient's agitation. Key points of the treatment are as follows [1,3]:

- Position the patient's head slightly up to prevent aspiration in the airways,
- Require appropriate surgical instruments, forceps, blunt hooks,
- Secretions should be suctioned in order to remove granulation tissue,
- A local vasoconstrictor is indicated,
- Risk manoeuvre - pushing the foreign body in order to reach the digestive tract.

The treatment also covers the complications:

- Chronic suppurative rhynitis;
- Maxilar and ethmoidal rhynosinusitis;
- Recurrent nasal hemorrhage;
- Sepsis;
- Meningitis (rare);
- Middle ear infection.

The sequelae are:

- Unilateral atrophic rhynitis;
- Perforation of nasal septum;
- Turbinates synechiae;
- Rhynolith.

Conclusions

Diagnosis of nasal foreign body should be made as early as possible. The more the patient is older, the consequences on long-term could be severe. Foreign body removal should be performed as soon as possible, with appropriate instrumentation, anaesthesia and a technique adapted to the type of foreign body. Consider regular checks after the intervention, which are very important in order to detect early the onset of sequelae. Prevention is essential in order to improve the quality of patient's life.

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