

# Management of foreign bodies in the ear, nose and throat in children: a review of 829 cases from Northern Anatolia

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## ABSTRACT:

**Objective:** The aim of this study was to evaluate cases of ear, nose and pharyngeal (ENT) foreign body (FB) in pediatric patients referred to the pediatric emergency department of the Department of Otorhinolaryngology in Tokat State Hospital (Turkey).

**Methods:** The paper comprises a retrospective study of all ENT foreign bodies presented to the pediatric emergency Department of Otorhinolaryngology in Tokat State Hospital (Turkey) between January 1, 2012 and December 31, 2018. Subject to evaluation were also demographic and clinical characteristics of the patients, types and anatomic locations of FBs, locations of FB by age groups, the method used to remove FBs and the distribution of FB cases by months.

**Results:** A total of 829 FB cases were evaluated in this study. The mean age of patients was  $47.8 \pm 31.4$  months. Of all patients, 404 (48.5%) were male, and 425 (51.2%) were female. The nose (58.7%) and the ear (20.2%) were the most common anatomical locations followed by mouth/pharynx/tonsil (12.3%), esophagus (6.2%) and the laryngotracheobronchial tree (2.4%). The most common FBs in different locations were beads in the nose (30.8%), beads in the ear (32.1%), fishbones in the mouth/pharynx/tonsil (56.8%), nuts and peanuts in laryngotracheobronchial tree (70%) and a coin/disc battery in the esophagus (80.7%).

**Conclusion:** FB in ENT is among the emergency conditions that require different diagnostic and treatment approaches based on anatomic localizations. Proper vision, adequate equipment and immobilization are important in the removal of ENT foreign bodies in children.

## KEYWORDS:

children, ear, foreign bodies, nose, pharynx

## ABBREVIATIONS

ENT – ear, nose and throat

FB – foreign body

## INTRODUCTION

Foreign body (FB) in the ear, nose and pharynx (ENT) is a clinical situation commonly encountered by emergency physicians and otolaryngologists [1]. FB in ENT constitutes 11% of all ENT emergencies [2]. FB cases may cause life-threatening complications if they are not managed carefully or if they are diagnosed late, and cost-management concerns may increase [3].

FBs in ENT cases are observed especially in children under five years of age [3, 4]. The reasons for this condition have been claimed to be curiosity of discovering orifices, boredom, games, intellectual disability, mental retardation, hyperactivity or attention deficit disorders and a lack of careful caregivers [5]. Previous studies showed that there is a difference in FB diversity in children according to anatomical regions. For example, nuts,

peanuts, and coins are common as tracheal and esophageal FBs while beads, candies or plastic toys are common in the ear and nose [3, 6]. Type, sharpness, size, chemical structure and anatomical location of FBs are the most important factors that affect morbidity and mortality [6]. Socioeconomic factors and healthcare opportunities affect the variety of FBs, related morbidity and mortality rates in FB cases [4]. It was argued that geographic factors and climatic differences also affect FB types. Oya et al. conducted a study in which they examined children who were admitted to the Emergency Unit due to FB in ENT, and claimed that FB types are associated with anatomic localization and climatic factors [7]. The aim of the present study was to examine the relationships between demographic characteristics of FBs in ENT cases in the pediatric emergency unit of our hospital, types and seasonal characteristics of FBs, and to introduce the characteristics of our approach to FB.

## MATERIALS AND METHODS

This retrospective study consisted of patients admitted to the pediatric emergency unit of our hospital with FB in ENT between

**Tab. I.** Demographic characteristics of the patients.

	Nose (n = 487) (%)	Ear (n = 168) (%)	Mouth/Pharynx/Tonsil (n = 92) (%)	Trachea/Bronchi/Lungs (n = 20) (%)	Esophagus (n = 52) (%)	Total
Mean age $\pm$ SD (months)	36.4 $\pm$ 13.1	67.6 $\pm$ 37.3	72.4 $\pm$ 49.2	20.55 $\pm$ 7.9	41.7 $\pm$ 26	47.9 $\pm$ 31.5
Sex						
Male	210 (43.1)	90 (53.5)	56 (54.9)	16 (80)	32 (61.5)	404
Female	277 (56.8)	78 (46.4)	46 (45)	4 (20)	20 (38.4)	425

SD – standard deviation

January 1, 2012 and December 31, 2018. Inclusion criteria were as follows: an age of 0-144-months, having complete medical records, applying to our pediatric emergency unit, having a foreign body in the ear, nose, mouth/pharynx/tonsil, esophagus and laryngo-tracheobronchial tree based on direct, endoscopic or radiological examination. Patients with mental retardation were excluded. Demographic characteristics of the patients and data about their FBs were obtained from the hospital records. The age, gender, accompanying clinical findings, localizations and types of FBs were analyzed. In addition, localizations of FBs were evaluated by months. The expertise of physicians (Emergency Department physician, ENT specialist, pediatric surgeon or chest surgeon) who removed FBs in patients who applied to the Emergency Unit was evaluated. In addition, the methods used to remove FBs were also evaluated by anatomical regions (removal with or without general anesthesia).

## STATISTICAL ANALYSES

Data collected about the patients were analyzed using the Microsoft Excel 2010 Software (Microsoft, Redmond, WA, the USA). This study was approved by the Local Ethics Committee (19-KAEK-52, 15.01.2019).

## RESULTS

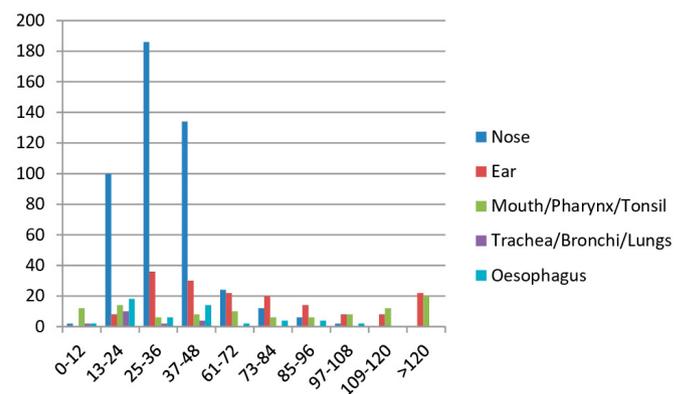
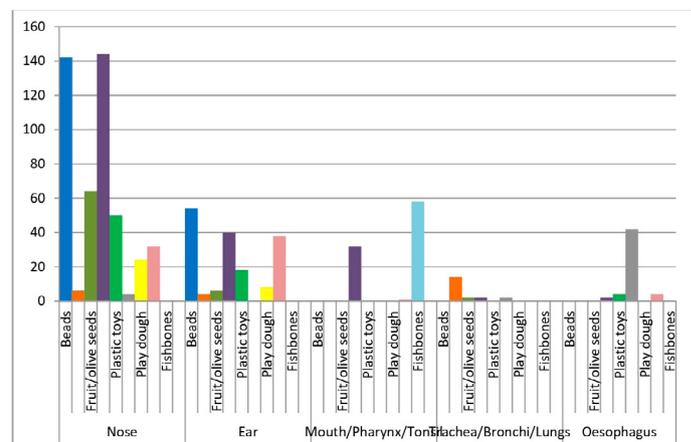
A total of 829 patients admitted to the pediatric emergency service of our hospital between January 2012 and December 2018 were considered eligible based on the inclusion criteria of the study. The youngest of the patients was six months old, and the eldest was 144 months old. The mean age of patients was  $47.8 \pm 31.4$  (month). Out of a total of 829 patients, 404 (48.7%) were male and 425 (51.2%) were female. Demographical characteristics of the patients by localization of the FBs were given in Tab. I. The localization of FBs was as follows: nose in 487 patients (58.7%), ear in 168 patients (20.2%), mouth/pharynx/tonsil in 102 patients (12.3%), esophagus in 52 patients (6.2%) and laryngotracheobronchial tree in 20 patients (2.4%).

The most common age for hospitalization due to FBs was 2–3 years with 245 cases (29.5%). The distribution of FBs by anatomic localizations and their ages were shown in Fig. 1.

The most common foreign bodies in ENT were beads and toy parts (32.8%). The distribution of FBs based on anatomical localizations was shown in Fig. 2.

In terms of the month of year, February and July (20.6%) had most FB incidents, while the months with the fewest incidents were May and September (15.1%). The distribution of FB cases based on anatomical localization was shown in Fig. 3.

The cases were most frequently referred to ENT specialists, and FBs were most commonly (54.1%) removed by ENT specialists

**Fig. 1.** Localization of FBs by age groups. FB, foreign body.**Fig. 2.** Type of FBs by anatomic location. FB, foreign body.

**Tab. II.** Expertise of physician performing FB removal operation.

	Total	Emergency Department Physician	ENT specialist	Pediatric surgeon	Chest surgeon
Nose	487	190 (39)	297 (60.9)	-	-
Ear	168	72 (42.8)	96 (57.1)	-	-
Mouth/Pharynx/Tonsil	102	46 (45)	56 (54.9)	-	-
Trachea/Bronchi/Lungs	20	-	-	-	20 (100)
Esophagus	52	-	-	52 (100)	-

followed by emergency physicians (36.8%). The distribution of removal of FBs by specialty areas was given in Tab. II. In most cases, FBs in the nose, ear, mouth/pharynx/tonsil were removed without general anesthesia. However, all of the FBs in the esophagus and laryngotracheobronchial tree were removed under general anesthesia. FB removal type based on anatomical localizations was given in Fig. 4.

### Nose (487 cases)

In 150 of 487 cases (30.8%), beads were identified as FB, followed by chickpea with 43 (8.8%) cases and beans with 35 (7.1%) cases. Disc battery was removed in four cases.

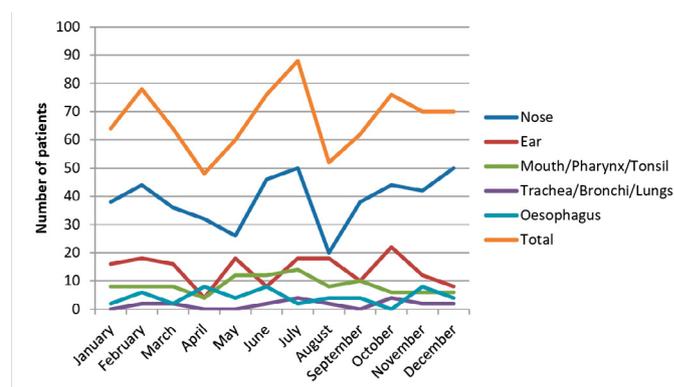
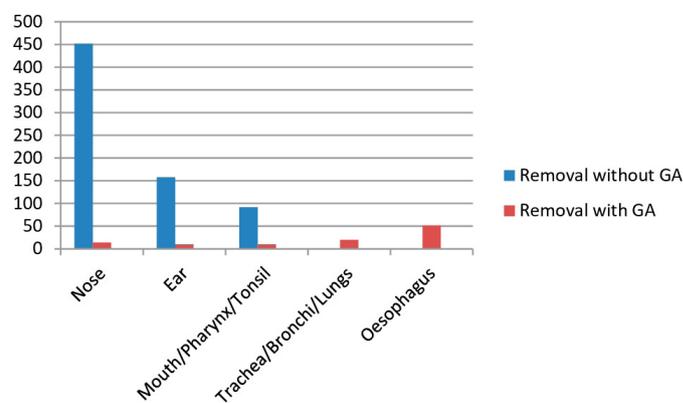
Most of the cases consisted of patients whose families noticed the FBs. In addition, there were also cases who reported due to local pain, nasal obstruction, epistaxis symptoms and patients with FB in the nose.

In most cases, FB was removed with the help of a curved hook under direct vision. Forceps or the suction method was employed in removing FBs such as a fly and pieces of paper. Nasal endoscopy was used to determine FB when it was suspected to be in the nose and when it was localized deeply. In seven cases, who did not have adequate cooperation or who had deeply-located FBs, they were removed under general anesthesia.

### Ear (168 cases)

In 54 of 168 cases (32.14%), FBs were beads. In 18 cases (10.7%), FBs were plastic toys while in 14 cases (8.3%) FBs were flies and in 14 (8.3%) cases they were pieces of paper.

About half of cases (46.4%) were asymptomatic and were brought to the emergency unit by their parents with a suspicion of FB. In other cases, several symptoms like hearing loss, earache and ear fullness were reported. In general, FBs were removed under direct vision with the help of a curved hook using a surgical otoscope. Alligator forceps were usually employed to remove FBs like paper and flies. In most cases (94%), FBs were removed in the emergency room or in the ENT clinic with direct vision. FBs were removed under general anesthesia in 10 cases (5.9%) who did not have adequate cooperation.

**Fig. 3.** The distribution of FB localization by months.**Fig. 4.** Distribution of FB removal operation by localizations.

### Mouth/Pharynx/Tonsil (102 cases)

In most cases with mouth/pharynx/tonsil localizations, FB was located in the tonsil (92 cases, 90.1%). No nasopharyngeal, hypopharyngeal or oral localizations were observed. However, in 8 cases (7.8%), FB was localized in the root of tongue and in 2 cases (1.9%) in the vallecula. Fish bone was the most common FB (58 cases; 63%), followed by sunflower shell with 32 cases (34.7%). In 2 cases (2.1%), a metal wire was removed from the vallecula. In 92 cases (90.1%), FBs were removed with the help of forceps under direct vision. In 10 patients (9.8%), FBs were removed under general anesthesia.

## Laryngotracheobronchial tree FBs (20 cases)

In 2 cases (10%), FB was localized in the trachea; it was located in right main or lobar bronchus in 12 (60%) patients and in the left main or lobar bronchus in 6 (30%). The most common FBs were hazelnuts and peanuts with 14 cases (70%), roasted chickpea were detected in 2 cases (10%), a sour cherry seed in 2 (10%) and a disc battery in 2 (10%). In a case who applied late, pneumothorax developed, and death occurred at the Intensive Care Unit. In all cases, FBs were removed by forceps under general anesthesia.

## Esophagus (52 cases)

Removed FBs were coins in 38 of 52 cases (73%), plastic toys in 4 (7.6%), disk battery in 4 (7.6%), metal ring in 2 (3.8%), plastic toy part in 2 (3.8%) and chicken bone in 2 cases (3.8%). Esophageal perforation occurred due to disc battery in 1 patient. FBs were removed under general anesthesia with rigid esophagoscope and forceps in all cases.

## DISCUSSION

Ear, nose, and pharyngeal FBs are clinical conditions commonly observed in ENT clinics and especially in emergency units. Both adults and children may apply to the hospital with this condition. ENT FBs, which pose a common emergency condition especially in children, are important in terms of social and cost-management aspects [6, 8]. Management of ENT FBs in emergency units is of significance. In general, foreign bodies in the ear may be removed without additional examination. However, since FBs in the esophagus and trachea cannot be seen directly, they frequently require radiological imaging and surgical intervention [8].

In the present study, we observed that the average age of children with FBs in different anatomical localizations was quite different. For example, while the average age of children with FB in the nose was  $36.4 \pm 13$  months, the average age of children with FB in the airway was  $20.55 \pm 7.9$  months and the average age of children with FN in the esophagus was  $41.7 \pm 26$  months. On the other hand, it was observed that children with ear FBs ( $67.6 \pm 37.3$  months) and mouth/pharyngeal/tonsil FBs ( $72.4 \pm 49.2$  months) had a higher average age. Similarly, some previous studies reported a lower age of children with FBs in the nose and airways [6, 9, 10]. The fact that swallowing function has not developed adequately in children between 0 — 3 years of age, the desire of children to discover their organs like their nose in this age group as well as easy access to the nose are among the causes of most FBs [6, 10, 11]. In children who are older than three years, there is an increase in FB incidence in the mouth/pharynx/tonsil [6]. The reason for lower nose and ear FB incidence rates in older children could be the changing eating habits and intellectual levels.

Previous studies mostly evaluated children and adults together, and reported that FB cases in the ear and nose mostly involve inorganic objects [3, 4, 12]. However, there are only a few studies that examine the diversity of FBs in children [6, 10]. In the present study, beads were most common FBs in the nose and ear. Other

common FBs in the nose and ear were organic objects like chickpeas, beans and cherry seeds. This could be explained by the fact that these objects are easily accessible at home. Higo et al. reported plastic toys as the most common FBs [13]. However, in tropical regions nasal myiasis cases are frequently experienced, which shows that sociocultural differences and climate affect FB diversity in the nose [8]. On the other hand, the incidence rate for fish bone as FB in the oropharynx and tonsil was similar to that reported by previous studies [6, 14]. The frequency of cases in which a sunflower shell was the FB was similar to that of cases in which a fishbone was the FB. This situation reflects the high roasted sunflower seed consumption as a confectionary in Turkey.

FBs in the ear are usually diagnosed clinically and removed without additional endoscopic and radiological evaluations and without any major risks [8, 15, 16]. However, a good otoscopic examination is necessary before removing FBs from the ear [8]. If there are no significant contraindications, FBs in the ear can be removed easily by emergency physicians [17]. In the present study, 42.8% of FBs in the ear were removed successfully by emergency physicians. On the other hand, the rate of FB removal by emergency physicians in the nose was reported at 38.6%. This situation may be associated with the fact that direct visual examination of the external ear canal is easier than that of the nose, and with the cul de sac feature of the ear. However, a lack of adequate equipment in emergency services and inexperience could hinder successful removal of FBs in the ear [8]. In our cases, most patients who referred to the ENT department were children in whom immobilization could not be achieved or vision was inadequate. Intervention under general anesthesia is recommended for such cases [18]. In the present study, 5.9% of ear FBs were removed under general anesthesia. Those were the cases in whom an adequate level of immobilization could not be achieved as well as cases with deeply localized FBs.

Additional examinations are not recommended if there is an adequate vision of FBs localized in the nose. As an exception, it is recommended to use a plain radiograph when a disc battery is suspected or when it really exists [19]. Most nose FBs can be removed using alligator forceps, curved hooks or the suction method under direct visualization without the need for general anesthesia [20]. We mostly used curved hooks to remove FBs in the nose. Major complications were not observed in any of the patients following FB removal. In our study, 3% of nose FBs were removed under general anesthesia. Most of these patients were the ones in whom immobilization could not be achieved.

When there is a suspected FB, it cannot be seen or it is in the laryngotracheobronchial tree, mouth/pharynx/tonsil and esophagus, a lateral neck x-ray and/or lung x-ray is needed [15, 16]. FBs visible in direct examination such as those in the mouth/pharynx and tonsils can be removed by emergency physicians under direct vision if the patient is stable [8]. When the FB is in the laryngotracheobronchial tree and esophagus, removal must be performed under general anesthesia with the help of bronchoscopy and rigid or flexible esophagoscopy [21]. Late diagnosis may cause bronchopneumonia and pneumothorax formation in FBs especially when they are localized in the bronchi [22]. In the present study, pneumothorax was observed in a hypoxic patient who presented to the

Emergency Unit with respiratory distress. Death occurred at the Intensive Care Unit on the 10th day of this patient's application to the ward. Hazelnut was the FB in this patient. Similar to previous studies [8, 16], in our study the most commonly detected FBs in the esophagus were coins. Esophagus FBs were removed under general anesthesia without significant complications. It was reported that the type of FBs in the esophagus was important. For example, disc batteries carry high-level potential risks for mucosal damage [13]. Especially in the presence of a disc battery in the esophagus, intervention is required within two hours to prevent damage to the esophagus [23]. In one of our patients we observed esophageal perforation due to disc battery.

In our study, we also examined the seasonal distribution of FBs and we found no significant differences among individual months. Similar results were reported in a study by Gomes et al. [24]. Oya et al. showed that the frequency of FBs in the ear and nose increases on rainy days, especially because in such case children spend more time at home. The same study found that in Japan, cases of fish bone in the throat increase in July

due to the increase in fish consumption in this month when religious holidays take place [7].

The present study had some limitations. The long-term effects and possible complications after FB trauma (septal perforation, ear drum perforation, tracheal stenosis, etc.) were not studied. Additionally, the retrospective nature of the study was another limitation.

## CONCLUSIONS

FB in ENT is among the emergency conditions that require different diagnostic and treatment approaches for various anatomic localizations of the FB. Although nasal and ear FBs are seen especially under the age of four in children, the rate of esophageal foreign bodies increases over four years of age. Proper vision, adequate equipment and immobilization are important in the removal of ENT foreign bodies in children. The adoption of proper approaches and management strategies are needed for FBs with different anatomical localizations.

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