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Original Research Article

Clinical spectrum of foreign bodies entrapped in ear, nose, and throat, in a tertiary care centre, Coimbatore

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ABSTRACT

Background: Foreign bodies (FB's) lodged in the ears, nose, and throat are common issues encountered by clinicians. The aim was to analyze the clinical spectrum of FBs entrapped in ear, nose, and throat methods of removal, outcomes and complications encountered in a tertiary care hospital.
Methods: A cross-sectional study carried out in a tertiary care center, from March 2021-June 2022 (all patients seeking emergency care for ENT FBs, visiting the Emergency Department, Otorhinolaryngology Department were included). ENT examination was done thoroughly for all the cases and relevant radiological investigations necessary for detecting the anatomical site, in cases of inaccessible areas, were taken.
Results: A total of 55 patients were included in this study among which the major proportion of the FB impactions were found in children <5 years of age. The most common site of FB lodgment was the hypopharynx and upper esophagus (n=25, 45.4%) and the most found objects were inert objects (n=23, 41.8%). The most common foreign body in oropharynx is fish bone, in hypopharynx and esophagus is chicken bone, in larynx and tracheobronchial tree is fish bone. In this study, FB was mostly removed using esophagoscopy.
Conclusions: Foreign bodies entrapped in the ear, nose, and throat most commonly occur in children <5 years. Early presentation with proper intervention reduces the rate of complications and the duration of hospital stay. Direct removal is the mainstay of treatment; however, in inaccessible areas where proper visualization cannot be achieved, radiographs followed by otoendoscopy, nasal endoscopy, laryngoscopy, bronchoscopy, and esophagoscopy are recommended depending on the clinical scenario.

Keywords: Hypocalcaemia, Parathyroid, Recurrent laryngeal nerve, Thyroidectomy

INTRODUCTION

Objects lodged in the ears, nose, and throat (ENT), referred to as foreign bodies (FB) are common issues encountered by specialists like otorhinolaryngologists, pediatricians, emergency department surgeons, general practitioners, and physicians in primary care settings.[1] In children <3 years, FBs entrapped in the ears and upper respiratory tract remain a leading cause of illness and death globally.[2] In children <5 years, the reported prevalence of FBs ranges from 57%-80%.[3] This high prevalence might be result of their inquisitive nature, lack of molars for proper mastication, playing and running with food in the oral cavity along consequent incoordination in swallowing and glottic closure.[4] Children have been reported to commonly inhale peanuts and other foreign bodies such as plastic or metallic beads and groundnuts. The materials ingested by adults includes accidentally consumed fish and chicken bones, as well as the aspiration of inorganic items such as plastic, coins,

and pins along with dental devices.[5] Aspiration of FB may cause choking, cough spell, gagging. If the object migrates distally, the airway symptoms become less prominent or even disappear. Signs of upper airway obstruction include dyspnea, drooling of saliva, stridor, cyanosis. Stridor is the frequent presentation of acute aspiration episode. A significant portion of patients presenting with foreign bodies in the ear exhibit no initial symptoms. In pediatric cases, the foreign body is frequently discovered incidentally. However, other patients may experience pain, symptoms consistent with otitis media (inflammation of the middle ear), hearing loss, or a sensation of aural fullness.[6] Soft and irregular objects in the ear may be extracted without need for referral to specialists (otolaryngologists). However, patients with aural hard or round Should be referred to otolaryngologists especially in cases where previous attempts had failed. The most useful instrument for ear FB removal is the micro-alligator. Referral is necessary to avoid worsening the position of the object and increasing the chances of requiring removal in the operating room itself.[7] The presentation of FB in the nasal cavity might vary, with bilateral symptoms. Apart from nasal discharge, patients mostly present with nasal occlusion, sneezing, and headaches.[8] While a nasopharyngeal FB may appear to be innocuous, it carries the inherent risk of significant complications and can be fatal if it enters the airway.

A foreign object lodged within the postnasal space poses a potential danger of aspiration or deeper impaction during removal attempts, potentially resulting in acute respiratory obstruction. Additionally, FBs lodged in the nasal cavity have been linked to the transmission of infectious diseases, including diphtheria, due to their ability to harbor causative organisms.[9] Objects in the throat can cause immediate difficulty breathing, especially in young children and elderly individuals. This can lead to delayed diagnosis in situations where symptoms develop gradually, as there might not be clear and dependable signs pointing toward a foreign object being present in the airway.[10] Since FBs lodged in the esophagus and trachea cannot be visualized directly, these frequently require radiological imaging and surgical intervention.[11]

Late diagnosis may lead to atelectasis, pneumothorax, bronchiectasis, and various other complications when they are localized in the airway.[12] Objects visible in direct examination (mouth/pharynx and tonsils) can be removed by emergency physicians under direct vision provided that the patient is stable. Foreign bodies present in the larynx-tracheobronchial tree and esophagus must be intervened and removed under general anesthesia with the help of bronchoscopy and esophagoscopy (rigid or flexible).[11]

Physicians must be aware of the clinical spectrum of the FBs ingested or aspirated or stuck in the ear, nose, or throat, and be prepared to render adequate and effective management, to prevent complications, and minimize morbidities.

Thus, the primary objective of our study was to describe the clinical spectrum of FB presentations in ear, nose and throat in the defined study population and settings. The secondary objective was to identify various modalities for foreign body removal and prevent complications by early intervention, thus reducing morbidity and mortality.

METHODS

Study design

The present study was a cross-sectional study and was conducted at the Department of Otorhinolaryngology, Emergency Department, PSGIMSR, Coimbatore, Tamil Nadu, India during March 2021-June 2022. The study was conducted after obtaining approval from the Institutional Human Ethics Committee, Ref: PSG/IHEC/2021/Appr/Exp/094 dated 29.04.2021.

Study population

The study included all patients seeking emergency care for ENT foreign bodies, visiting the Emergency Department, Otorhinolaryngology Department, PSGIMSR. Adults older than 80 years of age were excluded from the study.

Sample size calculation

With reference to Raj A et al, occurrence of foreign body in esophagus as 3.12%.[13]

Using this, sample size was calculated using the formula, n= 4pq/d*d, where n=sample size, p=3.12% ~3%, q=100, p=100-3, q=97, d=absolute precision=5%, n=4 x 3x97/5x5, n=~46. With expecting 20% non-response, required sample size will be 55.

Clinical examination and investigations

After obtaining the patient's consent, information concerning sex, and age was filled systematically. The entire ENT examination was done thoroughly for all the cases. Also, relevant investigations necessary for detecting the anatomical site, in cases of inaccessible areas were taken, like radiological investigations including X-rays and High-resolution Computed Tomography (HRCT)-in cases expecting complications. Blood investigations were taken if the removal was planned under sedation/GA. The removal of foreign bodies was done only with appropriate investigations.

Foreign body removal

Foreign body removal was done using relevant modalities, concerning the case like, Otoendoscopy, Diagnostic nasal endoscopy, laryngoscopy (Direct and Indirect), bronchoscopy, esophagoscopy, etc. Foreign bodies in the ear: In our study, patients with aural FB were examined under direct vision, otoscopic assistance, or if needed otoendoscopy. Most of these FBs were

present in the external canal. The majority of these were removed in OPD, by direct removal using forceps, probe or hook, suctioning, and syringing. Foreign bodies in the nose: for all cases of nasal FB, anterior rhinoscopy was carried out. Diagnostic Nasal Endoscopy was done in suspected cases, where FB is not visualized. Some cases were removed with/without the use of local anesthesia under direct vision, using hook, forceps, or suction. Uncooperative children with deep-seated FB required removal under GA. Inhaled foreign bodies: chest x-ray was done in almost all cases and the majority of cases showed definite findings for detecting the presence of FB. Rigid bronchoscopy was done in all patients who had positive findings and inpatients in whom FB inhalation was suspected with negative radiology.

Flexible bronchoscopy was performed for the removal of FB in the distal bronchus. Postoperatively these patients were managed with antibiotics, steroids, and other supportive measures. Ingested foreign bodies: In patients with FB ingestion, the direct examination was done using a tongue depressor and removed using forceps. Radiographs, usually neck x-rays, were done when FB was not seen. Computed tomography (CT) neck with chest, with/ without contrast was done in cases of delayed presentation with complications and also to confirm position in suspected cases. Indirect laryngoscopic examination was performed in co-operative patients for removal. When FBs were deep-seated or could not be visualized, removal was done using Direct laryngoscopy or Oesophagoscopy (both rigid and flexible) under GA, depending on location.

Data analysis

All the statistical data were entered in a Microsoft Excel Sheet for master chart preparation. The data were analyzed with IBM SPSS Statistics for Windows, Version 23.0. (Armonk, NY: IBM Corp). To describe data descriptive statistics, frequency analysis, and percentage analysis were used for continuous variables.

RESULTS

Age and sex

A total of 55 patients were included in this study among which the major proportion of the FB impactions (36.36%) were found in children less than 5 years of age. Among the study subjects, 52.7 % were male and 47.27 % were female. The age and sex distribution of the patients are shown in Figure 1.

Site and type of FB lodgment

FBs were mostly found in the hypopharynx and upper esophagus, (n=25, 45.4%), the second most common site being nasal (n=14, 25.4%) (Figure 2). The distribution of FB sites is presented in figure 3 and the most common site of entrapment of FB in the digestive tract was the cricopharynx with 37.9 %, followed by the hypopharynx (27.6%), oropharynx(13.8 %), pyriform fossa and esophagus (10.3 %).In our study, we found that most of the patients (n=23, 41.8%) presented with inert objects as FB (Figure 4).

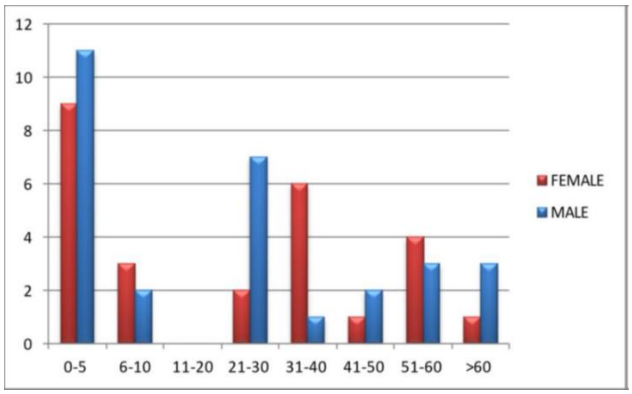

Figure 1: Age/sex distribution of the patients.

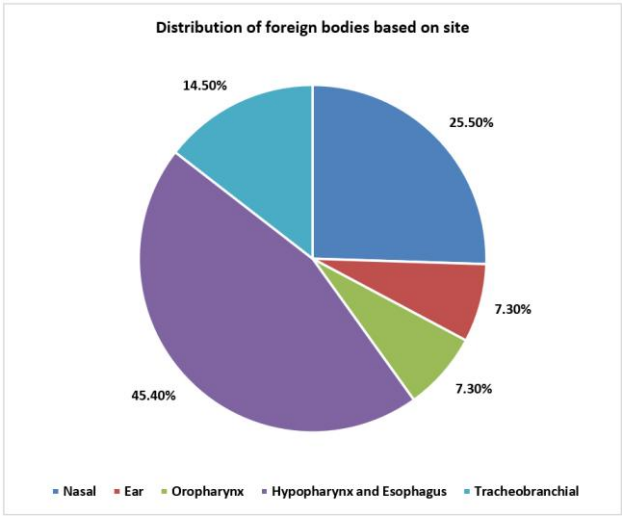

Figure 2: Overall distribution of foreign bodies according to site.

Table 1: Methods of removal of foreign bodies.

S. No	Procedure	Frequency	Percentage (%)
1	DNE	13	23.6
2	Direct laryngoscopy	6	10.9
3	Esophagoscopy	23	41.7
4	Direct removal	5	9.1
5	Bronchoscopy	4	7.3
6	Otoendoscopy	4	7.3

DNE, Diagnostic nasal endoscopy

Method of removal of foreign bodies

The results from table 1 showed that of the methods used to remove the foreign bodies, esophagoscopy was the

most common used (41.7%) followed by DNE (23.6%). The most common site encountered with lodged foreign body was the hypopharynx and esophagus with 25 foreign bodies of which chicken bone followed by inert objects (8) were the most common. This was followed by the nose which involved 11 inert objects (Table 2).

Table 2: Foreign bodies encountered for each site.

S. No	Site of foreign bodies	Insect	Vegetative matter	Inert object	Mutton bone	Chicken bone	Fish bone	Denture
1	Ear	2 (3.64%)	1 (1.82%)	1 (1.82%)	-	-	-	-
2	Nose	-	3 (5.45%)	11 (20%)	-	-	-	-
3	Oropharynx	-	-	1 (1.82%)	-	-	3 (5.45%)	-
4	Hypopharynx and oesophagus	-	-	8 (14.55%)	1 (1.82%)	9 (16.36%)	3 (5.45%)	4 (7.27%)
5	Larynx and tracheobronchial tree	-	2(3.64%)	2(3.64%)	-	1 (1.82%)	3 (5.45%)	-

Table 3: Details of the foreign bodies removed in the operation theatre.

S. No	Site of FB	Foreign body	Frequency (n)	Method of removal	Theatre/OPD removal
1	Ear	Insect	2	Otoendoscopy	OPD
		Vegetative matter	1		
		Inert object	1		
2	Nose	Vegetative matter	3	Diagnostic nasal endoscopy	OPD
		Inert object	10		
		Button battery	1		Theatre
3	Oropharynx	Inert object	1	Direct removal	OPD
		Fish bone	3		
4	Hypopharynx and oesophagus	Button battery	2	Esophagoscopy	Theatre
		Coin	2		
		Toy	2		
		Plastic lid			
		Open pin			
		Coin		Direct laryngoscopy	
		Mutton bone		Esophagoscopy	
		Chicken bone			
		Fish bone			
		Denture			
		Denture		Direct laryngoscopy	
5	Larynx and tracheobronchial tree	Vegetative matter		Bronchoscopy	Theatre
		Whistle		Bronchoscopy	
		Nose pin		Bronchoscopy	
		Chicken bone		Bronchoscopy	
		Fish bone		Direct laryngoscopy	

The details of the removal also showed that most objects were removed from the nose by means of DNE in the OPD (13). Only objects that were found in the hypopharynx and esophagus as well as larynx and tracheobronchial tree required the operation theater for treatment. (Table 3).

When the results were classified based on age, the most common foreign object among the children aged between 0-5 years was coins (3) followed by vegetable matter, peanuts, button batteries, fish bone (2 each) (Table 4).

In our study, we found that 2 out of 8 cases of tracheobronchial foreign bodies and 1 out of 29 cases of digestive tract foreign bodies had a doubtful shadow. Definite findings were seen in 6 cases of tracheobronchial foreign bodies and 24 cases in digestive tract foreign bodies.

Table 4: Distribution of foreign bodies based on age groups encountered.

Foreign body	Age 0-5	Age 6-10	Age 21-80
Vegetable matter	2	0	1
Peanut	2	0	0
Toy wheel	1	0	0
Button battery	2	0	0
Fish bone	2	0	6
Bean	1	0	0
Coin	3	0	0
Hay piece	1	0	0
Rubber band	1	0	0
Chalk piece	1	1	0
Paper ball	1	0	0
Whistle	1	0	0
Battery LED	1	0	0
Miniature toy	1	0	1
Cotton ball	0	1	0
Plastic pen lid	0	1	0
Eser	0	1	0
Iron screw	0	1	0
Chicken bone	0	0	8
Live insect	0	0	2
Nose pin	0	0	1
Stone	0	0	1
Crayon	0	0	1
Denture	0	0	3
Open pin	0	0	1
Dentures	0	0	1
Mutton bone	0	0	1

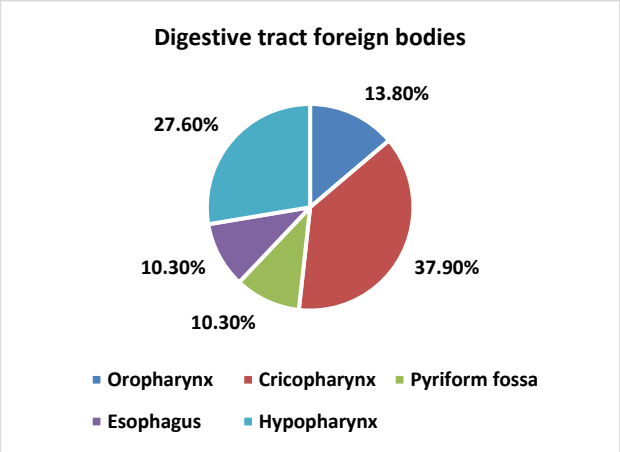

Figure 3: Site of digestive tract foreign bodies.

Day of presentation, hospital stay, and complications after FB lodgment

About 90.9% of patients had FB intraoperatively and were successfully removed and 9.1% had no foreign body intraoperatively. Furthermore, 72.8% of patients presented on the same day of FB entrapment,16.3 % presented between 1-5 days, and 10.9 % after 5 days. We found that 25.5 % had complications due to delayed removal, which was because of delayed presentation to the hospital; these included retropharyngeal abscess, edema, necrosis, pneumonia, etc. 74.5% had no complications. We found that 21.8 % of patients were treated and discharged on the same day, 16.4 % on 1stpost-admission day, 12.7 % on 2nd day, 25.5 % on 3rd day, and 23.6 % stayed in hospital for more than 3 days, depending on the severity of complications. (Table 5).

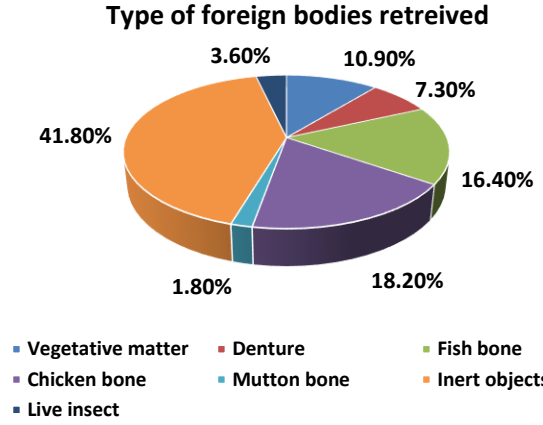

Figure 4: Types of foreign bodies.

Table 5: Day of presentation, treatment period and complications of treatment.

Variable	Sub category	Percentage (%)
Need for intraoperative treatment	Yes	90.9
	No	9.1
Day of presentation	Same day	72.8
	1-5 days	16.3
	After 5 days	10.9
Complications due to delayed removal	Yes	25.5
	No	74
Day of discharge	Same day	21.8
	1 day after admission	16.4
	2 days after admission	12.7
	3 days after admission	25.5
	More than 3 days after admission	23.6

DISCUSSION

Foreign bodies entrapped in the ear, nose, and throat are common encounters in ENT practice and the management is filled with challenges. It is frequently encountered by otorhinolaryngologists since they mostly

deal with most of the natural orifices of the body that are habitually exposed like mouth, ears, and nostrils.

A total of 55 patients were included in the study among which more than one-third (n=20, 36.36%) of the affected patients were children ages 5 years and below. Other studies reported similar findings where patients were below the age of 5 years 4,14,15 or 10 years.[2,15] Among the study subjects, 52.7 % were male and 47.27 % were female. This slight male preponderance is similar to various other studies and could be attributed to the overactive nature of male children compared to their female counterparts.[16] However, contrasting results have also been reported in the literature.[2,11,19]

In our study, the most frequent site of FB lodgment was the hypopharynx and upper esophagus, accounting for 45.35% of cases, the second most common site being nasal which was 25.4%. The other sites for FB lodgment were trachea-bronchial (14.4%), ear (7.2%), and oropharynx (7.3%). In the digestive tract, the cricopharynx was the major site accounting for 37.9% of cases. However, various studies have reported different prevalences of anatomical locations of FB lodgment with the nose/nasal cavity being the commonest one in many studies.[2,11,20,21] Ear has also been reported to be a common site of FB in various studies.[20-23] In our study, we found that 23 patients (41.8 %) presented with inert objects as FB, other objects found were vegetative matter, denture, fish bone, chicken bone, mutton bone, and live insects. According to various studies, inorganic objects and seeds were reported to be commonly encountered FBs in various anatomical locations.[2,4,15,24]

In our study, most patients reported to our hospital on the same day (n=40, 72.8%); 9 patients (16.3%) reported between 1-5 days, and 6 patients (10.9%) presented after 5 days of the incident. Furthermore, 21.8 % of cases were discharged on the same day after FB removal, 23.6% stayed in the hospital for more than 3 days and 25.5 % got discharged on 3rd postoperative day, depending on the severity of complications. Due to delayed presentation to the hospital complications occurred in 25.5% of cases (lung complications, retropharyngeal abscess, edema in digestive tract FB, mainly by chicken bone and fish bones). In a recent cross-sectional study, Abraham ZS et al (2023) reported that 53.6% of the patients presented at the hospital in <24 hours after lodging of FBs, 41.1% of them presented between 24 and 72 h, and 5.3% of them presented after 72 hours of lodgment of FBs in specified anatomical sites.

Foreign body complications vary by geography. Nasal septal perforation, sinusitis, and rhinoliths can occur from foreign items in the nose, which may also be aspirated into the tracheobronchial tree. Otitis externa or media and tympanic membrane perforation may result from ear foreign substances. Obstructive emphysema, atelectasis, lung abscess, and recurrent pneumonia can occur from foreign materials in the tracheobronchial tree. Bronchoscopic removal may cause laryngospasm, postoperative stridor, arytenoid displacement, or pneumothorax. The risk of problems is affected by the type of foreign body in the hypopharynx and esophagus. For instance, delayed button battery removal might cause mucosal damage, esophageal perforation, mediastinitis, or tracheoesophageal fistula. Stridor, hematoma, granulation tissue, abscess, and stricture are other possible complications. In kids, the tracheal lumen might compress, causing breathing issues Delayed diagnosis of foreign body aspiration can lead to retained foreign bodies, repeated pneumonias, bronchiectasis, hemoptysis, pneumothorax, lung abscesses, pneumomediastinum, and more.[25,26]

Complications were mostly seen in those patients who presented to the hospital between 24 and 72 hours (84.6%) of FB lodgment. In our study, 2 out of 8 cases of tracheobronchial FBs and 1 out of 29 digestive tract foreign bodies had a doubtful shadow. Definite findings were seen in 6 cases of tracheobronchial FBs and 24 cases in digestive tract foreign bodies. In a cross-sectional retrospective hospital-based study by Awad AH et al (2018), radiographs were taken when the exact location of FB could not be found. About 82.72% of FBs were radio-opaque, and 11.76% of FBs showed normal radiograph; in 30 (5.52%) cases, no X-ray was performed, because the FB was visible to the naked eye, located in the oropharynx/oral cavity. Na'ara S et al in their retrospective study of cases showed that in the infant group, 48% presented with normal X-ray findings compared to only 20% in the older group; 15% of the older group had a positive chest X-ray for a foreign body.[27] In our study, 23.6% FB was removed using diagnostic nasal endoscopy, 10.9% with direct laryngoscopy, 41.7 % with esophagoscopy (both rigid and flexible), 9.1% were directly removed, 7.3% using bronchoscopy (both rigid and flexible), 7.3% by otoendoscopy. A review of 698 cases of pediatric external ear foreign bodies in 2002 demonstrated that in contrast to otolaryngologists, emergency physicians mostly removed FBs under direct visualization. However, the success rates of removal under direct visualization were less while removing objects near the tympanic membrane, with spherical shapes, and objects that had been in the canal for >24 hours. Higher complication rates were the outcome of unsuccessful removal attempts.[28] In a retrospective cohort study of 1724 cases of childhood nasal FBs, FBs with anterior localization were removed with a speculum, a suction device, a foreign body curette, and forceps. In some cases, owing to the posterior lodgment of the FB, and/or the patient's inability to cooperate, they were treated under sedation in the operating room. FB removal was done after orotracheal intubation in patients with a risk of aspiration.[29] Rigid bronchoscopy was used to remove the inhaled FB in all patients (100%) in a cross-sectional hospital-based retrospective study by Awad AH et al (2018).[1] They also reported that in 5.52% of cases(with FBs lodged in the tonsil or oropharynx, base of the

tongue, and vallecula), FBs were removed with or without the use of local anesthesia by grasping forceps. For ingested FBs, rigid or flexible or esophagogastroscopy is indicated, or in very critical cases even a thoracotomy or laparotomy for the recovery of the FB may be necessary, depending on the type.[30-33]

Nasal foreign bodies are more common in children. Majority of patients with nasal Fb seek medical care immediately. Unfortunately, some cases may go unnoticed. In such cases, presenting complaints will be unilateral, purulent, and foul-smelling nasal discharge, prolonged epistaxis, unilateral nasal obstruction. These patients are often misdiagnosed and treated as sinusitis. On examination, congested and edema of mucosa, granulation, mucous, ulceration or necrosis may be seen.[29] Recent studies reveal that foreign bodies are predominantly found in children under the age of 10, with the nasal cavity being the most prevalent location, followed by the ear and pharynx.[2] Contrary to certain findings that identify the hypopharynx and esophagus as significant sites, other research highlights nasal involvement as predominant.[34] This variance highlights geographical disparities in FB types and placements.[2] Inorganic items such as coins are often identified as prevalent foreign bodies, particularly in pediatric cases.[2] Organic substances, such chicken bones, are also common among specific communities.[34] The kind of the foreign body frequently determines the intricacy of extraction methods. Removal procedures differ according to location and type. Basic situations involving nose or ear foreign bodies can frequently be addressed with direct visibility instruments such as suction catheters or forceps in outpatient environments. Nevertheless, more intricate instances that require endoscopic or surgical intervention required hospitalization.[35] Complications from foreign bodies can be serious, encompassing infections and tissue damage. Postponed presentation heightens the likelihood of problems; therefore, timely medical intervention is essential to avert negative consequences.[2,34]

The spectrum and horizon of otorhinolaryngology have widened and the pattern of distribution of emergency workload has increased in recent years. Early intervention by a skilled ENT surgeon is thus required for any emergencies in cases of FB removal. This prevents life-threatening complications and aids in decreasing the morbidity and mortality rate. This study was designed to sketch out the various modes of presentations, relevant investigations, complications, and chosen clinical methods in the retrieval of FBs.

Parents and guardians should be educated about the potential consequences of various types of FBs lodged in the ENT region, especially in very young children, and the need for immediate management of the same. One limitation of this present study was that it was a single-center study with a small sample size. Thus, further studies with more sample sizes are necessary to evaluate the clinical spectrum and the potential consequences along with their management.

CONCLUSION

The study analyses the clinical spectrum of FB entrapped in ear, nose, and throat, and also methods and complications of these FB. Foreign bodies entrapped in the ear, nose, and throat are commonly encountered phenomena in the emergency department, especially in children under 5 years of age. Direct removal is the principal method of treatment; however, in inaccessible cases where proper visualization cannot be achieved, radiograph followed by otoendoscopy, nasal endoscopy, laryngoscopy (direct and indirect), bronchoscopy, and esophagoscopy are recommended depending on the specific clinical scenario. In our study, digestive tract FB are more common. About 25.4% had complications due to delayed removal of FB from the site. Hence, in conclusion, early identification and early intervention are the key to successful management of these accidents.

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