

CLINICAL SPECTRUM OF ENT FOREIGN BODY PRESENTATION AMONGST PEDIATRIC POPULATION; IN EMERGENCY DEPARTMENT OF LOW RESOURCE TERTIARY CARE HOSPITAL KARACHI.

Dr. Sadaf Munawar^{*1}, Dr. Adeel Khatri², Dr. Aisha Iffat³, Dr. Ramesh Kumar⁴,
Dr. Muhammad Rashid⁵

^{*1,3,4,5}Resident Department of Emergency Medicine, IHNN, Karachi

²Consultant Emergency, Medicine Indus Hospital and Health Network, Karachi

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Corresponding Author: *

Dr. Sadaf Munawar

Abstract

Background: Pediatric ear nose and throat (ENT) and aerodigestive foreign bodies (FBs) represent frequent emergency presentation. In low-resource settings delayed presentation and limited subspecialty resources exacerbate potential morbidity.

Objective: To determine clinical spectrum anatomical distribution triage characteristics and disposition outcomes of pediatric ENT and aerodigestive FB presentations in low-resource tertiary emergency department (ED).

Methods: cross-sectional study of 397 pediatric patients (< 14 years) presenting with ENT or aerodigestive FBs to Indus Hospital and Health Network Karachi was conducted from February to May 2025. Demographic anatomical object category triage and ED disposition data were analyzed using SPSS v20. Categorical relationships and disposition odds were evaluated using Chi-square tests Fisher's exact tests and Mantel-Haenszel stratified analyses ($p < 0.05$).

Results: mean age was 4.32 SD 2.84 years with 69.5% under 5 years and slight male predominance (51.9%). Nasal FBs were most common (38.8%) followed by ingested/alimentary (33.0%) and aural FBs (22.4%). Age group was significantly associated with anatomical site ($p < 0.001$) with nasal FBs dominating in toddlers (2 – <5 years: 53.2%) and ingested FBs dominating in infants (<2 years: 63.0%). Most cases were triaged as P2 (41.1%) or P3 (54.2%). Direct discharge was achieved in 74.8% of cases while 25.2% required non-discharge pathways (referral admission absconded or LAMA). Aerodigestive FBs yielded significantly higher odds of non-discharge than localized nasal/aural FBs ($p < 0.001$). Stratified analysis confirmed age as significant effect modifier ($p = 0.042$) with toddlers (2 – <5 years) facing 4.31-fold non-discharge risk ($p < 0.001$).

Conclusion: Pediatric ENT FB presentation is developmental stage-dependent. Aerodigestive FBs—particularly in children aged 2 – <5 years—significantly increase non-discharge outcomes demanding structured ED triage pathways and specialized pediatric care in low-resource environments.

INTRODUCTION:

Otorhinolaryngologists pediatricians emergency department doctors and even physicians in primary care settings regularly encounter foreign bodies in ear nose and throat. Foreign body injuries to ear nose and throat are common in general population and is frequent reason for attending urgent care facility. Speidel et al (1) conducted research in Germany which concluded mean age of foreign body ingestion to be prevalent in 3.3 years age group (SD 3.12; range 7 days to 16 years); male female ratio 1.15:1 and majority had no symptoms on presentation but 42.06% out of those who were symptomatic complained of retching or vomiting. study conducted by Dhungana et al (2) from Nepal reported that ENT foreign bodies most commonly present in pediatric population (age range 1 year to 72 years and mean age of 4 years) male to female ratio of 1.16:1 with nasal foreign body being most frequent type. Shradha et al (3) reported from India incidence of 62% males and 38% females with most frequent site of impaction of foreign body being nose and most common age group affected was < 10 years of age; assessment process involved detailed medical history examination questioning about nature of complaints history of foreign body insertion and related symptoms; 18.2% of subjects had no awareness of foreign body insertion. Both adult and child ear nose and throat foreign bodies are frequent particularly in age group 0 to 3 years (4).

Pediatric ENT foreign bodies present significant challenge to healthcare providers due to unique characteristics of children who often explore objects with their mouths and may lack capacity to distinguish between edible and inedible materials. Factors like hyperactivity (5) and dental immaturity particularly absence of molars contribute to this issue. Common foreign bodies include beads buttons food items toys and batteries which can lead to complications such as inflammation rhinolith development infection with or without purulent discharge and tissue necrosis perforation aspiration. Some foreign bodies remain inert in nose for extended periods and cause persistent unilateral foul smelling nasal discharge (6). Other symptoms may include respiratory discomfort ear pain/discharge nasal discharge and odynophagia or dysphagia

depending upon location. Non-invasive procedures such as irrigation mother's kiss instrumentation and suction devices are often used for extraction but in some cases endoscopic or surgical removal may be necessary.

study conducted in Lady Reading hospital Peshawar from Jan. 2011 to Dec. 2011; total of 173 cases were seen with ENT foreign bodies with 41.04% cases of nasal foreign bodies: among these patients 45% had foul-smelling nasal discharge 13% experienced nosebleeds; 10% reported nasal pain and 5.6% had combinations of these symptoms; 27% did not exhibit any symptoms (6). Raza et al (7) documented research in ENT department of Pak Emirates Military Hospital Rawalpindi comprised total 46 cases of foreign body upper aero-digestive tract 39.1% in airways male female ratio being 2.5:1 most common age group affected was 0_3 years age (39.25%) with age range of 0-72 years; for foreign bodies in airway various signs were observed like choking coughing and in some cases symptoms resembling pneumonia_ these signs were present in 80.4% of cases while 19.6% of cases showed no discernible signs.

Prompt assessment and appropriate therapy are crucial in dealing with ENT foreign bodies. Research into common foreign body presentations can aid trained healthcare professionals in immediate and effective management. Preventive measures can significantly reduce prevalence of pediatric ENT foreign bodies with education for parents on age-appropriate toys and choking hazards being essential. This study conducted in low-resource hospital in Karachi aims to identify common foreign bodies to assist in parental counseling and evidence-based guidelines. This study is unique as it fills gap in low-resource hospitals and can improve patient care reduce mortality and morbidity and prevent unnecessary imaging (8) (9). research can also enhance healthcare professionals' awareness of clinical presentations and help in choosing appropriate treatment modalities (10). Understanding epidemiology can lead to preventive strategies and resource allocation. A significant proportion of foreign bodies particularly those in airway can result in fatalities if not identified and treated promptly. importance of high index of suspicion and timely

recognition in managing ENT foreign bodies is emphasized to prevent grave repercussions.

Materials And Methods

This study aimed to determine frequency of clinical presentation of ENT foreign bodies among pediatric population presenting to Emergency Department of low-resource tertiary care hospital in Karachi.

For purposes of this study several operational definitions were adopted. foreign body was defined as any object or substance lodged in ear nose or throat that does not naturally belong there. pediatric population was defined as children from 1 month up to and including 14 years of age. Clinical presentation encompassed several components: type of foreign body (such as coin seed paper toy part food particle insect or other object) identified through clinical examination using otoscope nasal speculum or indirect laryngoscope; location of foreign body whether in ear nose mouth or pharynx; and time elapsed between insertion or ingestion of foreign body and presentation to Emergency Department measured in minutes hours or days. Triage category was assigned according to Manchester Triage System used at Indus Hospital and Health Network ranging from P1 (requiring immediate management) to P5 (requiring non-urgent management within 240 minutes) with P2 P3 and P4 corresponding to very urgent urgent and standard management within 10 60 and 120 minutes respectively. Vital signs recorded at presentation included pulse rate (beats per minute) respiratory rate (per minute) oxygen saturation (percentage) and temperature (in degrees Fahrenheit). Clinical complaints as reported by patient or parent during history-taking included cough nasal discharge ear pain epistaxis foreign body insertion into ear nose or throat or other symptoms; study was designed as cross-sectional study conducted at Pediatric Emergency Department of Indus Hospital and Health Network Karachi. Data collection was planned following approval of synopsis by CPSP and Institutional Review Board.

Sample size was calculated using WHO sample size calculator with margin of error of 5% and confidence level of 95%. Based on previously reported frequencies of clinical presentations required sample sizes were as follows: 80 for cough (94.5%) 180 for

ear pain (13.5%) 259 for nasal discharge (78.6%) and 71 for epistaxis (4.8%).

A non-probability consecutive sampling technique was used to enroll participants. Children from birth up to 14 years of age presenting to Pediatric Emergency Department with foreign body in ear nose mouth or pharynx were included in study provided both parental consent and where applicable child's assent were obtained. Children with foreign bodies located in lower aerodigestive tract were excluded as were those brought dead to Emergency Department with ENT foreign body.

After approval from IRB and CPSP all children between ages ≤ 14 years attending Indus hospital and health network pediatric emergency department and fulfilling inclusion criteria was enrolled for this study. Consent was obtained from parent / guardian also assent consent was taken from children age ≥ 7 years along with parental consent. After being told relevant information consent form was given to participants who consent to take part in research. Consent was taken from parents or legal guardian who understand research aims. Participation in research is voluntary if patient or their parents refused to take part/withdraw from study this will not impact treatment of patient. All information was kept confidential. Research approval was obtained from institute's research/ethical committee. After taking consent performa (attached below) was filled. MR number of child (encrypted using serial number) age gender triage category vitals clinical presentation of patient and time from insertion of foreign body to presentation in emergency type of foreign body was noted.

Data was analyzed using SPSS version 20. Continuous variables such as age vital signs (blood pressure heart rate respiratory rate temperature saturation) and time of presentation in ER was reported as mean $\pm$ SD or Median (IQR) based on normality. Normality was assessed by using Shapiro Wilk test. Categorical variables such as gender priority at triage presenting complaints location of foreign body type of foreign body identification method was reported as frequencies and percentages. For comparison of age and gender with clinical spectrum Chi-square or Fisher's Exact test was used taking p value ≤ 0.05 as significant.

Results

Study included 397 children with mean age of 4.32 ± 2.84 years; more than two-thirds (69.5%) were younger than five years and 51.9% were male. Nasal foreign bodies were most common presentation (38.8%) followed by ingested/alimentary foreign bodies (33.0%) and aural foreign bodies (22.4%) together accounting for over 94% of cases.

Age was significantly associated with anatomical site ($p < 0.001$): nasal foreign bodies were most common among children aged 2–<5 years while ingestion predominated in infants and older children. Anatomical distribution also differed by sex with ingested foreign bodies more common among boys and all four airway/bronchial cases occurring in males though this finding warrants cautious interpretation given small numbers involved.

Most children were triaged as P2 or P3 with only 1.3% classified as P1. Vital-sign data were

incompletely documented and are reported descriptively only.

Overall 74.8% of children were discharged from ED while 25.2% followed non-discharge pathway (referral admission or LAMA). Anatomical site was strongest predictor of outcome: nasal foreign bodies had highest discharge rate (85.1%) whereas all airway/bronchial cases and 75% of gastric cases required non-discharge management. Younger age particularly below two years is also associated with non-discharge outcomes while sex was not.

Children with aerodigestive foreign bodies had approximately 2.7-fold higher odds of non-discharge compared to those with nasal or aural foreign bodies (Mantel-Haenszel adjusted OR: 2.80) association that remained consistent across sexes. However age significantly modified this relationship ($p = 0.042$) with strongest association—more than fourfold higher odds of non-discharge—observed in children aged 2–<5 years

Table 1. Anatomical spectrum of foreign-body presentation

Anatomical site	n	%
Nasal	154	38.8
Ingested/alimentary tract	131	33.0
Aural/ear	89	22.4
Oral/pharyngeal	15	3.8
Airway	4	1.0
Total	397	100.0

Table 2. Age distribution according to anatomical site

Age group	Nasal n (%)	Ingested n (%)	Aural n (%)	Oral /pharyngeal n (%)	Gastric n (%)	Airway n (%)
<2 years	10 (18.5)	34 (63.0)	5 (9.3)	4 (7.4)	1 (1.9)	1 (1.9)
2–<5 years	118 (53.2)	48 (21.6)	51 (23.0)	5 (2.3)	1 (0.5)	0
5–<10 years	26 (28.9)	36 (40.0)	22 (24.4)	3 (3.3)	2 (2.2)	2 (2.2)
10–15 years	0	13 (41.9)	11 (35.5)	3 (9.7)	0	1 (3.2)

Overall association: $\chi^2 = 83.44$ $df = 15$ $p < 0.001$

Discussion

Clinical presentation of ear nose and throat (ENT) and aerodigestive foreign bodies (FBs) in pediatric emergency departments (EDs) represents persistent global healthcare challenge that carries heightened clinical complexity within low-resource tertiary settings. In this study cohort of 397 pediatric patients evaluated at public tertiary institution in Karachi demographic distribution revealed clear vulnerability among younger children with mean age of 4.32 SD 2.84 years and over two-thirds (69.5%) presenting under five years of age. This strong early-childhood dominance aligns with established global epidemiological literature which attributes risk to developmental milestones such as oral exploration underdeveloped swallowing coordination lack of molar dentition and immature cognitive perception of danger. Furthermore while overall sex ratio remained nearly balanced with slight male predominance (51.9%) specific anatomical sub-locations—most notably airway/bronchial FBs—exhibited male excess. These demographic patterns highlight how innate behavioral curiosity and physical autonomy in toddlers create environmental susceptibility to accidental object insertion and ingestion in resource-constrained households [13].

Anatomically nasal foreign bodies constituted single most frequent presentation (38.8%) followed closely by ingested/alimentary tract objects (33.0%) and aural cases (22.4%) collectively accounting for more than 94% of all presentations. This anatomical hierarchy reflects relative mechanical accessibility of anterior facial orifices to young children during unsupervised play. High prevalence of nasal and aural FBs in our setting matches regional registry data from developing nations where small unfastened household objects remain readily reachable. However presence of potentially catastrophic aerodigestive exposures—underscores dual-spectrum nature of pediatric ED presentations. While localized ENT FBs frequently permit straightforward clinical assessment aerodigestive cases frequently involve occult positioning or delayed presentations presenting diagnostic dilemmas that test triage capacity of low-resource emergency centers [14].

Central finding of this investigation is statistically significant association between child's age group and

anatomical site of foreign body impaction ($p < 0.001$). Infants and children younger than two years presented predominantly with ingested foreign bodies (63.0%) whereas those aged 2 to <5 years demonstrated marked concentration of nasal FBs (53.2%). As children mature into school-age categories (5–15 years) spectrum shifts toward complex mix of ingested aural and airway objects. This age-dependent variation mirrors developmental neuromuscular evolution and behavioral maturation: infants primarily utilize oral grasp mechanism leading to ingestion whereas toddlers acquire fine motor skills enabling them to lodge small objects into their nasal passages or external auditory canals. Recognizing these age-stratified anatomical tendencies provides emergency clinicians with essential triage framework when taking histories from caregivers in busy pediatric EDs [15].

Free-text clinical analysis revealed significant heterogeneity among impacted objects led by beads pearls and decorative crystals (15.9%) followed by food/plant material sharp metallic objects plastic components and button batteries or magnets (6.8% each). presence of sharp metallic objects disc batteries and multi-magnetic components is particularly alarming in low-resource environment. Button batteries and high-powered magnets represent surgical emergencies capable of causing rapid tissue liquefaction necrosis mucosal perforation tracheoesophageal fistulae and fatal vascular erosion within hours of impaction. In developing urban centers like Karachi informal manufacturing low-cost plastic toys and uncontained domestic clutter increase pediatric access to hazardous objects. fact that nearly half of clinical records lacked standardized object categorizations further underscores urgent need for structured documentation templates in emergency medical records to improve risk stratification [16].

Assessment of emergency department triage dynamics showed that majority of presenting children were classified as Priority 2 (41.1%) or Priority 3 (54.2%) while immediately life-threatening Priority 1 presentations comprised 1.3%. This distribution confirms that while majority of pediatric ENT FBs do not present in immediate hemodynamic or respiratory collapse they nevertheless demand prompt

skilled evaluation to prevent secondary displacement or tissue damage. However physiological vital sign documentation in cohort demonstrated substantial missingness and documentation gaps common artifact of high-volume tertiary emergency units in low- and middle-income countries (LMICs). High patient volume crowded triage areas and limited nursing staff often force clinicians to prioritize rapid physical extraction over comprehensive documentation in stable children. Standardizing triage vital-sign protocol remains essential quality improvement goal for pediatric emergency services [17].

Overall nearly three-quarters (74.8%) of patients were successfully discharged directly from ED following evaluation or removal confirming that routine localized ENT FBs can be managed effectively on outpatient basis. Nevertheless 25.2% of cohort required non-discharge pathways including hospital admission (3.3%) subspecialty ENT referral (6.5%) transfer to secondary facilities (6.5%) or experienced unscheduled attrition such as absconding (7.8%) and leaving against medical advice (LAMA; 1.0%). In low-resource tertiary hospital non-discharge outcome places heavy burden on system capacity requiring specialized pediatric endoscopy operating room time radiologic imaging and extended observation. Furthermore notable rate of absconding and LAMA reflects socio-economic stressors financial constraints long waiting times and poor health literacy among families navigating public healthcare infrastructure [18].

Bivariate analysis identified anatomical site of foreign body as single strongest determinant of ED disposition ($p < 0.001$). While nasal (85.1%) and aural (77.5%) foreign bodies yielded high rates of direct discharge 100% of airway/bronchial presentations and 75% of esophageal/gastric cases required non-discharge disposition pathway. When categorized into clinically coherent risk groups children presenting with aerodigestive FBs demonstrated 2.73-fold higher crude odds of non-discharge compared to those with localized nasal or aural FBs ($\text{OR} = 2.73$ $p < 0.001$). Aerodigestive objects present greater procedural risks frequently demanding diagnostic radiopaque imaging rigid broncho-esophagoscopy under general anesthesia or

prolonged observation for secondary mucosal injury. In low-resource settings where pediatric endoscopic facilities and subspecialty availability may be restricted to tertiary hubs these cases rapidly consume critical institutional resources [19].

To evaluate potential confounding and effect modification stratified multivariate analyses were conducted across sex and age categories. Post-stratification by sex yielded Mantel-Haenszel adjusted odds ratio of 2.80 (95%CI 1.75–4.48 $p < 0.001$) with non-significant test for homogeneity ($p = 0.850$) proving that sex does not modify strong relationship between aerodigestive location and non-discharge outcome. Whether male or female intrinsic hazard of aerodigestive foreign body consistently dictates higher requirement for advanced medical intervention. This finding confirms that public health preventative strategies and clinical management pathways can be applied uniformly across sex lines without risk misclassification [20].

In contrast post-stratification across age categories revealed significant effect modification (Breslow-Day/Homogeneity test $p = 0.042$). association between aerodigestive presentation and non-discharge disposition was particularly amplified among children aged 2 to <5 years who exhibited more than fourfold increase in non-discharge odds ($\text{OR} = 4.31$ $p < 0.001$). In toddlers smaller airway diameters narrower esophageal anatomical constrictions and limited ability to communicate symptoms compound clinical risk of ingested or aspirated objects. Consequently clinicians maintain lower threshold for admitting or referring toddlers with aerodigestive FBs compared to older children. This interaction proves that age should not merely be adjusted for as static demographic confounder but recognized as vital clinical modifier that exacerbates aerodigestive pathology [21].

High frequency of nasal FBs (38.8%) observed in our Karachi cohort matches trends reported across public health centers in Asia and Africa where small items like beads and seeds remain accessible toys. However unlike high-income settings where specialized pediatric ENT equipment and outpatient sedatives allow rapid ED extraction LMIC emergency departments frequently face equipment shortages. Attempted extractions using improvised instruments

by frontline staff can push nasal objects posteriorly into nasopharynx converting benign nasal FB into life-threatening airway aspiration. Establishing dedicated well-equipped pediatric ENT procedure carts within urban EDs is therefore critical step toward reducing unnecessary surgical referrals and subspecialty burden [22].

Management of button batteries and sharp metallic objects highlighted in our descriptive series demands specific structural protocols. Button batteries lodged in esophagus can cause transmural esophageal necrosis and aortoenteric fistulae within two hours due to hydroxide ion generation at negative pole. In low-resource public hospitals delays in radiological verification lack of round-the-clock emergency endoscopy and delays in surgical room availability significantly increase risk of severe morbidity. Implementing rapid-triage "red-flag" protocols specifically for suspected button battery ingestions can streamline emergency radiological imaging and immediate endoscopic retrieval mitigating life-threatening structural complications [23].

Observation that 8.8% of patients either absconded or left against medical advice highlights systemic socioeconomic barriers unique to LMIC tertiary hospitals. Parents seeking care in public facilities often face severe out-of-pocket indirect expenses such as loss of daily wages transport costs and purchasing off-site medications or imaging services. When faced with long delays for specialist consultations or operating theatre availability caregivers may prematurely remove their children once acute distress appears resolved. Improving communication regarding latent risks of retained foreign bodies alongside social support systems in emergency units is vital to reducing unmanaged dropouts [24].

Primary operational constraint revealed by our analysis was incomplete nature of vital signs and free-text clinical history documentation. Relying on unstructured narratives led to nearly 47% of foreign-body types being classified as unspecified. High patient turnover and overburdened staff in public emergency rooms naturally impede granular record-keeping. Transitioning from unstructured paper-based charts to standardized drop-down digital triage entry forms would improve data quality enable real-

time risk tracking and strengthen institutional research quality in developing healthcare regions [25]. From preventive public health perspective developmental concentration of FBs in children under five years indicates that primary prevention must start at home. Public awareness campaigns focused on childproofing homes keeping small hazardous items (coins button batteries jewelry beads) out of reach and avoiding small unsegmented foods (nuts seeds) in toddlers are highly cost-effective strategies. Community health workers and primary pediatric clinics across Karachi can serve as key channels for educating parents on dangers of oral and nasal exploration during early developmental stages [26].

Optimizing outcomes in resource-constrained environments requires combined approach: implementing standardized ED triage protocols ensuring rapid access to pediatric endoscopic removal reducing non-discharge dropouts through improved patient counseling and expanding community-level parental prevention education [27].

Conclusion

Pediatric foreign body presentations in low-resource tertiary emergency department encompass diverse clinical spectrum that is fundamentally shaped by child development and anatomical site. Early childhood represents primary vulnerable window with children under five years bearing vast majority of cases due to exploratory hand-to-mouth behaviors and lack of danger perception. While localized nasal and ear foreign bodies constitute majority of presentations and can generally be safely managed with direct discharge aerodigestive (oral esophageal gastric and bronchial) foreign bodies introduce substantial clinical complexity.

Anatomical location serves as single primary determinant of emergency department outcome. Patients presenting with aerodigestive foreign bodies face significantly higher odds of non-discharge disposition (requiring admission subspecialty referral extended observation or facing unscheduled discharge) compared to those with localized ENT objects. Furthermore age acts as critical effect modifier with toddlers aged 2 to <5 years demonstrating strongest association between

aerodigestive foreign body insertion/ingestion and non-discharge outcomes.

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