

CLINICAL PROFILE AND MANAGEMENT OF BRONCHO-ESOPHAGEAL FOREIGN BODIES: A RETROSPECTIVE ANALYSIS OF 110 CASES

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ABSTRACT

Aims: To evaluate the clinical profile, anatomical distribution, and management outcomes of broncho-esophageal foreign bodies in a tertiary care setting.

Material and Methods: This retrospective clinical study analyzed 110 consecutive patients who presented with broncho-esophageal foreign bodies between March 2024 and May 2026. The study included demographic data, symptomatology, type and site of the foreign body, surgical interventions, and post-operative complications.

Results: The cohort comprised 54 males and 56 females with a mean age of 5.1 years. The pediatric population (≤ 18 years) accounted for 96.3% (n=106) of cases. Non-vegetative objects were predominant (82.7%, n=91), with coins being the most frequently impacted object overall (66.3%, n=73). The cricopharynx was the most common site of impaction in the digestive tract (62.7%, n=69). Among airway foreign bodies, the right principal bronchus was significantly more involved (n=28) than the left (n=4). General anesthesia (GA) was utilized in 96.3% (n=106) of extractions, primarily via rigid esophagoscopy and bronchoscopy. The success rate of endoscopic removal was excellent, with a 99.1% complication-free recovery rate; only one patient experienced a tension pneumothorax.

Conclusion: Broncho-esophageal foreign bodies remain a critical pediatric emergency, predominantly involving coins in the cricopharynx and vegetative matter in the right bronchus. Prompt radiological evaluation followed by rigid endoscopy under general anesthesia is a highly safe and effective management paradigm with minimal morbidity.

KEYWORDS: Broncho-esophageal foreign bodies; Foreign body aspiration; Foreign body ingestion; Pediatric emergencies; Rigid bronchoscopy; Rigid esophagoscopy; Cricopharyngeal impaction; Endoscopic foreign body removal; General anesthesia; Postoperative complications.

INTRODUCTION

The accidental ingestion or aspiration of foreign bodies (FBs) within the broncho-esophageal tract represents one of the most critical and frequently encountered emergencies in otorhinolaryngological and pediatric practice. It demands immediate diagnostic recognition and prompt therapeutic intervention due to the high risk of catastrophic acute complications, such as asphyxia, total airway obstruction, and visceral perforation, as well as chronic sequelae including bronchiectasis, lung abscess, mediastinitis, and esophageal stricture formation [1, 2].

While individuals of any age can present with broncho-esophageal FBs, the condition disproportionately affects the pediatric demographic, particularly toddlers and preschool-aged children. This vulnerability stems from several developmental and behavioral factors: a natural exploratory instinct to examine small objects via the mouth, an immature swallowing reflex, the absence of molar dentition required for proper mastication, and a tendency to play or run while eating [2, 3]. In adults, FB impaction occurs less frequently and is usually associated with underlying structural pathologies (such as esophageal webs or malignancies), neuromuscular deficits, intoxication, or the use of dental prostheses that impair mucosal sensation [4].

The clinical presentation of a broncho-esophageal FB varies dramatically based on the nature of the object, its anatomical location, and the time elapsed since ingestion or aspiration. Airway FBs typically present with an acute paroxysmal cough, wheezing, stridor, or respiratory distress. In contrast, FBs lodged in the esophagus are more frequently characterized by throat pain, dysphagia, drooling, or vomiting [1, 5]. A significant clinical challenge arises when the ingestion or aspiration is unwitnessed, leading to delayed presentations where early localized symptoms progress to mimic chronic conditions like asthma or recurrent pneumonia [4, 6].

The anatomical site of impaction is governed by distinct structural constraints. In the upper gastrointestinal tract, the cricopharyngeal sphincter—representing the narrowest anatomical zone of the esophagus—serves as the predominant site for FB entrapment [5, 7]. Conversely, in the lower respiratory tract, the right main stem bronchus is the preferred site of lodging for aspirated objects. This is dictated by tracheobronchial anatomy, as the right main bronchus has a wider diameter, a shorter length, and a more vertical trajectory relative to the tracheal axis compared to the left [8].

Plain radiography remains the cornerstone of initial diagnostic assessment, allowing for rapid localization of radiopaque objects (such as coins, which dominate pediatric FB ingestion) and the detection of indirect signs of radiolucent vegetative FBs, such as hyperinflation or atelectasis [3, 9]. Once identified, rigid endoscopy under general anesthesia—specifically

rigid esophagoscopy for digestive tract objects and rigid bronchoscopy for airway bodies—remains the gold-standard intervention. This approach ensures maximum airway control, excellent visualization, and adequate working channels for safe instrument manipulation, boasting success rates exceeding 94% with minimal morbidity in experienced hands [10, 11].

While comprehensive multi-center studies provide broad clinical perspectives, localized retrospective audits are vital for understanding regional object distributions and refining institutional emergency protocols. The purpose of this study is to analyze the clinical profile, anatomical distribution, and management outcomes of 110 consecutive patients presenting strictly with broncho-esophageal tract FBs, thereby contributing regional data from Central India to the existing literature on managing these high-stakes emergencies.

MATERIALS AND METHODS

Study Design and Setting

This retrospective clinical study was conducted at the Department of Otorhinolaryngology and Head & Neck Surgery at Netaji Subhash Chandra Bose Medical College, Jabalpur, Madhya Pradesh. The study evaluated the medical records of patients who presented with broncho-esophageal tract foreign bodies over a roughly two-year period, concluding in May 2026.

Ethical Considerations

The study protocol was reviewed and formally approved by the Institutional Ethics Committee (IEC) of Netaji Subhash Chandra Bose Medical College. As the research involved a retrospective chart review of anonymized patient data, the requirement for direct informed patient consent was waived by the committee. Patient confidentiality was strictly maintained throughout the data extraction and analytical phases.

Inclusion and Exclusion Criteria

The study included 110 consecutive patients, across all age groups, who presented to the emergency or outpatient departments with a clinically and radiologically confirmed diagnosis of a broncho-esophageal tract foreign body, and who subsequently underwent endoscopic or surgical extraction at the institution. Patients with foreign bodies lodged exclusively in the upper pharynx (e.g., nasopharynx, pyriform fossa) were excluded to focus strictly on deeper broncho-esophageal impactions. Patients were also excluded from the analysis if they spontaneously expelled the foreign body prior to medical intervention, were managed exclusively with conservative observation, left the hospital against medical advice (LAMA) before a procedure could be performed, or had significantly incomplete clinical records.

Data Collection and Statistical Analysis

Clinical data were systematically extracted from hospital admission registers, operation theater logs, and individual patient case sheets. The variables recorded for each case included patient demographics (age and gender), the estimated duration elapsed between ingestion/aspiration and hospital admission, primary symptomatology at presentation, and preoperative diagnostic radiological findings.

Intraoperative findings were reviewed to confirm the exact anatomical site of impaction and the specific nature of the foreign body. Objects were broadly categorized into vegetative and non-vegetative groups. Furthermore, the type of surgical procedure performed, the mode of anesthesia utilized, and any documented intraoperative or postoperative complications were recorded.

Data compilation and preliminary processing were performed using spreadsheet software. Statistical analysis was fundamentally descriptive in nature. Continuous variables were expressed as means and ranges. Categorical variables were analyzed and expressed as absolute frequencies (n) and percentages (%).

RESULTS

A total of 110 consecutive patients who presented with broncho-esophageal tract foreign bodies were included in this retrospective analysis. The demographic details, divided by age group and gender, are outlined in Table 1. The cohort demonstrated a near-equal gender distribution, comprising 54 males (49.1%) and 56 females (50.9%). The condition overwhelmingly affected the pediatric demographic, with 106 cases (96.3%) occurring in individuals aged 18 years or younger. The highest incidence was observed in the toddler and preschool age group (1 to 5 years), accounting for 60.9% (n = 67) of all presentations.

Table 1: Demographic Details (Age Group and Gender)

Parameter	Sub-category	Number of Cases (n)	Percentage (%)
Age Group	Infants (≤ 1 year)	17	15.4%
	Toddlers & Preschool (1–5 years)	67	60.9%
	School-age (6–12 years)	21	19.1%
	Adolescents (13–18 years)	1	0.9%
	Adults (> 18 years)	4	3.6%
Gender	Male	54	49.1%
	Female	56	50.9%

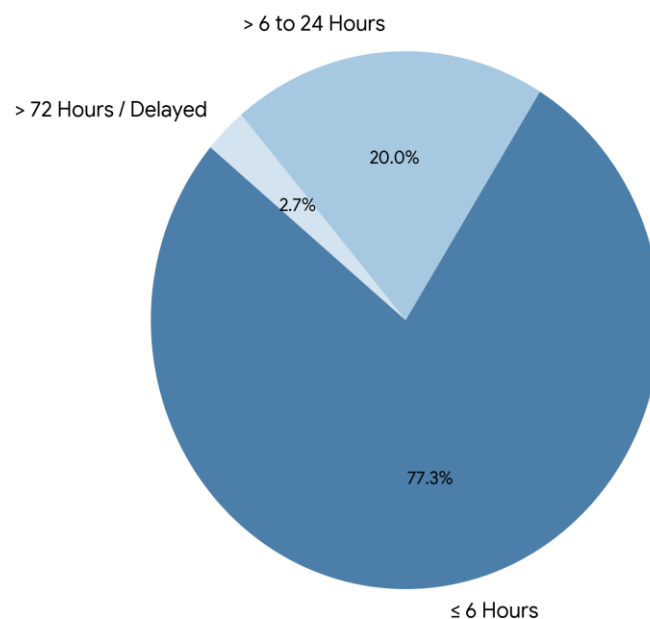
The clinical presentation profile is detailed in Table 2, alongside the visual distribution of time to presentation in Figure

1. The majority of patients presented to the emergency department promptly, with 77.2% (n = 85) arriving within 6 hours of the suspected ingestion or aspiration event. Pain in the throat was the most frequently reported primary symptom, followed by respiratory distress and vomiting.

Table 2: Clinical Presentation Profile (Primary Symptoms)

Primary Symptom	Number of Cases (n)	Percentage (%)
Pain In Throat	46	41.8%
Respiratory Distress	25	22.7%
Vomiting	12	10.9%
Difficulty In Swallowing	7	6.4%
Pain In Throat, Vomiting, Respiratory Distress	6	5.5%

Figure 2: Time to Presentation



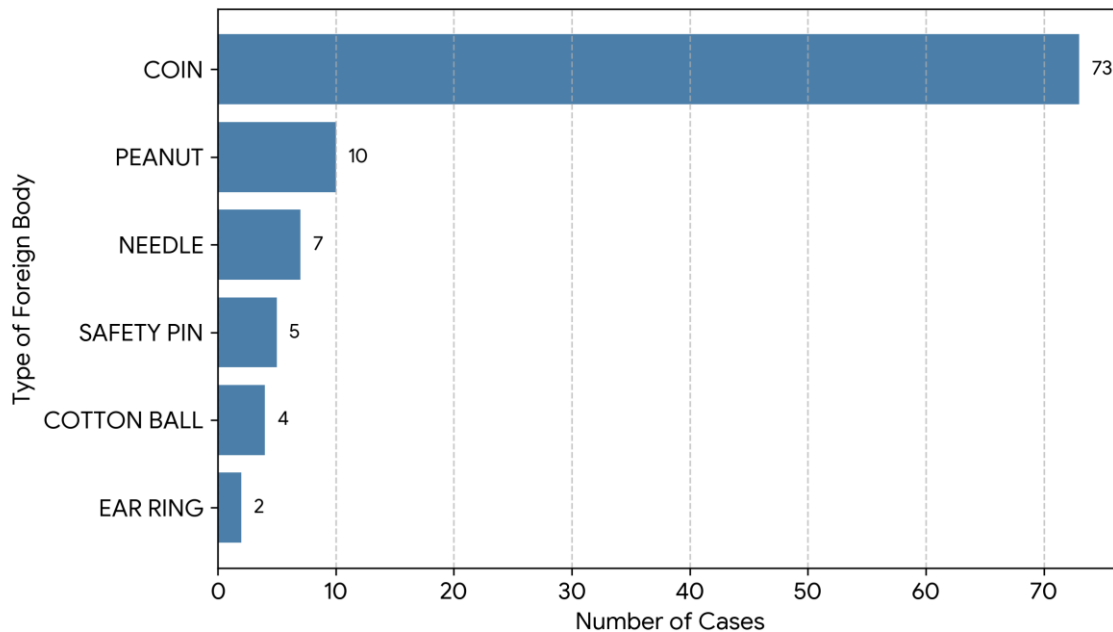
The anatomical distribution of the impacted foreign bodies, cross-tabulated with the nature of the object, is detailed in Table 3. The digestive tract was the primary site of impaction in 70.0% of cases (n = 77), while the lower airway was involved in 30.0% of cases (n = 33). Within the digestive tract, the cricopharynx was the most common site of arrest, accounting for 62.7% (n = 69) of all cases in the study. In the respiratory tract, foreign bodies showed a strong predilection for the right principal bronchus (n = 28), which was involved seven times more frequently than the left principal bronchus (n = 4).

Table 3: Cross Tabulation of Anatomical Site of Impaction by Nature of Foreign Body

Anatomical Site	Non-Vegetative (n=91)	Vegetative (n=19)	Total Cases
Esophageal Tract			
Cricopharynx	69	0	69 (62.7%)
Esophagus (Upper/Mid/Lower)	6	2	8 (7.3%)
Tracheobronchial Tract			
Right Principal Bronchus	16	12	28 (25.4%)
Left Principal Bronchus	0	4	4 (3.6%)
Other (Trachea/Larynx)	0	1	1 (0.9%)

The spectrum of foreign bodies extracted is illustrated in Figure 2. Non-vegetative objects constituted the vast majority of the foreign bodies (82.7%, n = 91) compared to vegetative matter (17.3%, n = 19). Coins were overwhelmingly the most common foreign body encountered, representing 66.3% (n = 73) of the total cohort, followed by peanuts and needles.

Figure 1: Spectrum of Broncho-Esophageal Foreign Bodies



Regarding therapeutic intervention (Table 4), all patients underwent endoscopic evaluation and extraction. General anesthesia (GA) was utilized in 96.3% of the procedures (n = 106). Rigid esophagoscopy was the most frequently performed procedure (64.5%, n = 71), correlating with the high rate of cricopharyngeal impactions. The clinical outcomes were excellent; successful extraction was achieved in all cases, and 99.1% of the cohort (n = 109) experienced an uneventful, complication-free postoperative recovery.

Table 4: Management Interventions (Surgical Intervention and Post-Op Complications)

Variable	Findings	Number of Cases (n)	Percentage (%)
Surgical Intervention	Rigid Esophagoscopy under GA	71	64.5%
	Rigid Bronchoscopy under GA	30	27.2%
	Other Endoscopy under GA	8	7.2%
	Removal under Local Anesthesia / Sedation	1	0.9%
Post-Op Complications	None	109	99.1%
	Tension Pneumothorax	1	0.9%

DISCUSSION

The accidental ingestion or aspiration of a foreign body (FB) is a potentially life-threatening emergency that requires a high index of clinical suspicion and immediate intervention. The present study reviewed 110 consecutive cases of broncho-esophageal tract FBs managed at a tertiary care center in Central India. The overarching success of the interventions—evidenced by a 99.1% complication-free extraction rate—highlights the efficacy of standardized endoscopic protocols under general anesthesia.

Consistent with global epidemiological literature, our cohort demonstrated a massive pediatric predominance, with 96.3% of cases occurring in patients aged 18 years or younger, and nearly 61% concentrated in the toddler and preschool age group (1–5 years) [1, 12]. This specific age distribution is deeply tied to child development. At this age, children actively explore their environment via the mouth, possess an immature swallowing mechanism, lack the posterior molar dentition required to grind hard foods like peanuts, and frequently engage in active play while eating [3]. Gender distribution in our study was nearly equal (49.1% male, 50.9% female), which contrasts with some literature that reports a slight male predominance due to highly active play behaviors, though regional variations are well-documented [12, 13].

The nature of the impacted object in our study strongly correlated with the anatomical site of arrest. Non-vegetative objects, predominantly coins (66.3%), accounted for the vast majority of upper digestive tract impactions. The cricopharynx was the absolute most common site of lodgment, responsible for 62.7% of all cases and 100% of the digestive tract cases involving non-vegetative objects. Anatomically, the cricopharyngeal sphincter represents the narrowest segment of the human esophagus. Its powerful resting muscular tone and transition zone physiology make it a natural bottleneck for rigid, flat objects like coins, which typically align in the coronal plane [7, 14].

Conversely, the respiratory tract demonstrated a distinct predilection for vegetative matter, such as peanuts and grams. When a foreign body bypassed the larynx and entered the lower airway, it lodged in the right principal bronchus in 84.8%

of the tracheobronchial cases (28 out of 33). This finding strictly aligns with the anatomical architecture of the pediatric and adult tracheobronchial tree. The right main bronchus is wider in diameter, shorter in length, and deviates from the tracheal axis at a much shallower angle (more vertical) than the left main bronchus, acting as a direct funnel for aspirated material [8, 15]. Vegetative FBs in this location present a unique challenge; organic matter absorbs mucosal moisture, swells over time, and triggers intense localized inflammatory mucosal reactions, which can complicate delayed extractions [6].

The management paradigm utilized in this cohort relies heavily on rigid endoscopy under general anesthesia (GA), which was employed in 96.3% of the cases. While flexible endoscopy has gained traction in some centers for diagnostic purposes or distal airway objects, rigid esophagoscopy and bronchoscopy remain the gold standard for therapeutic extraction in pediatric emergencies [11, 16]. The rigid endoscope provides a secure airway, superior optical clarity, and allows for the passage of robust grasping forceps capable of manipulating swollen vegetative matter or sharp non-vegetative objects (like the 7 needles and 5 safety pins in our cohort).

The complication rate in this series was exceptionally low at 0.9% (a single case of tension pneumothorax following the extraction of a vegetative FB from the right bronchus), comparing highly favorably against complication rates of 2% to 5% reported in recent multicenter audits [13, 16]. This complication is a known risk of rigid bronchoscopy, particularly when dealing with friable vegetative matter that may cause a ball-valve effect leading to hyperinflation and subsequent alveolar rupture.

Limitations: The primary limitations of this study are its retrospective design and single-center framework, which may introduce selection bias. Furthermore, reliance on medical records limits the ability to track long-term, post-discharge chronic pulmonary sequelae in patients who aspirated vegetative matter.

CONCLUSION

Broncho-esophageal tract foreign bodies remain a critical surgical emergency predominantly affecting the pediatric population, particularly children under the age of five. Our experience with 110 cases reinforces that coins are the most ubiquitous ingested object, routinely arresting at the cricopharynx, while vegetative matter poses a severe aspiration risk with a strong anatomical predilection for the right principal bronchus. Prompt radiological evaluation, coupled with swift rigid endoscopy (esophagoscopy or bronchoscopy) performed under general anesthesia, is a highly effective, safe, and definitive management strategy that yields excellent clinical outcomes with negligible morbidity.

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