

A Prospective Analysis of Factors Related with Spontaneous Passage of Ingested Foreign Bodies in Children: An Institutional Based Study

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ABSTRACT

Background: Foreign body ingestion is a common pediatric emergency, with variable clinical outcomes ranging from spontaneous passage to life-threatening complications. Management depends on multiple factors, including patient age, object characteristics, and presenting symptoms. Identifying predictors of spontaneous passage can guide decision-making, reduce unnecessary interventions, and improve patient safety. Present study was a prospective analysis of factors related with spontaneous passage of ingested foreign bodies in children.

Materials and Methods: Present study was conducted on 66 children presenting with suspected or confirmed foreign body ingestion. Eligible participants were enrolled from the pediatric emergency and outpatient departments after applying inclusion and exclusion criteria. Clinical data were recorded in a structured proforma, including demographic characteristics, presenting symptoms, type and nature of foreign body (metallic vs non-metallic, blunt vs sharp, radiopaque vs radiolucent), and site of lodgement. The primary outcome was spontaneous passage of the foreign body, confirmed through stool examination, radiological clearance, or symptom resolution. Secondary outcomes included need for intervention and complications.

Results: Among 66 participants, the majority were under 5 years (42.42%), with male predominance (57.58%). The most common presenting complaints were drooling (18.18%) and dysphagia (15.15%), although 22.73% were asymptomatic. Metallic (66.67%), blunt (72.73%), and radiopaque (78.79%) objects were most frequently ingested. Spontaneous passage occurred in 49 children (74.24%), while 17 (25.76%) required

intervention (14 endoscopic, 3 surgical). Age was significantly associated with spontaneous passage ($p=0.041$), with higher clearance in children <5 years (82.14%). Shape was also significant ($p=0.002$), with blunt objects passing spontaneously in 85.42% compared to 44.44% for sharp ones. Sex and radiological property did not show significant associations. Complications occurred in 16.67%, mostly minor mucosal abrasions; perforation occurred in only 1.52%.

Conclusion: Spontaneous passage of ingested foreign bodies is common in children, particularly with blunt objects and younger age. Careful risk stratification based on these predictors can reduce unnecessary interventions, while ensuring timely management of high-risk cases.

Keywords: Foreign Body Ingestion; Pediatrics; Spontaneous Passage; Endoscopy; Risk Factors.

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INTRODUCTION

Foreign body ingestion is a frequent pediatric emergency that spans the full spectrum from benign self-limited events to life-threatening complications. Developmental curiosity, oral exploratory behavior, and limited risk awareness make early childhood particularly vulnerable, while evolving household technologies and toy markets continually introduce new hazards into the domestic environment. For clinicians working in emergency departments and pediatric units, the first challenge is often diagnostic: determining if an ingestion truly occurred, what

was ingested, and where it currently resides. Many caregivers witness the event or notice a missing object, but a substantial proportion of children are asymptomatic at presentation, necessitating judicious use of history, targeted examination, and imaging. The clinical course hinges on the interplay between patient factors (age, anatomical caliber, and comorbidity), object characteristics (size, shape, composition, and surface), and anatomic location at the time of assessment.¹ Although the majority of ingested foreign bodies traverse the gastrointestinal

tract spontaneously, practice variation persists regarding who should be observed, when to intervene, and how aggressively to pursue localization. Conservative management is appealing given that unnecessary procedures can expose children to sedation risks, endoscopic complications, and cost; yet delayed intervention in high-risk scenarios—such as esophageal impaction, multiple magnets, or button batteries—can be catastrophic. Establishing the likelihood of spontaneous passage is therefore the pivotal decision point that shapes triage, imaging strategy, observation duration, and the threshold for endoscopic retrieval. In routine clinical care, this estimation is often implicit and experience-based. A data-driven approach that quantifies the contribution of readily available variables can make these decisions more consistent, safer, and more transparent to families.^{1,2}

Object characteristics exert outsized influence on outcomes. Blunt, smooth items of modest diameter are more likely to progress uneventfully with peristalsis, whereas sharp or irregular objects are prone to impaction, mucosal trauma, and perforation. Composition matters both for radiologic visibility and for intrinsic tissue toxicity. Metals and other dense materials are typically radiopaque and straightforward to track on plain films, improving the confidence of a non-operative plan. Radiolucent plastics, wood, and thin glass may elude radiography, prompting consideration of adjunctive imaging or endoscopy when symptoms or clinical suspicion remain high.³⁻⁶ Special categories deserve explicit mention in any discussion of pediatric ingestions. Button batteries can generate alkali injury and thermal damage within a short period when lodged in the esophagus, with devastating sequelae if not recognized promptly, and remain a leading modern hazard in the home.² High-powered neodymium magnets, particularly when ingested in multiples or alongside metallic items, can attract across adjacent bowel loops and cause pressure necrosis, fistulae, and perforation—an object-specific risk profile that mandates early recognition and decisive management.¹ Even seemingly innocuous items like coins behave differently depending on location and child size; in smaller children, the relative caliber of the esophagus and pylorus substantially alters the probability of spontaneous transit. Household surveys and emergency department series consistently demonstrate coins as a dominant exposure, reflecting their ubiquity and easy accessibility to toddlers.^{3,4}

For clinical teams, these data translate into nuanced observation strategies that incorporate coin size, patient age, and symptom trajectory.³ Patient-related determinants are equally important. Younger children have narrower luminal diameters and less ability to articulate symptoms, which may simultaneously increase the risk of impaction and delay recognition. Prior gastrointestinal anomalies, strictures, or prior surgery can reduce passage rates and complicate extraction. Symptomatology drooling, dysphagia,

odynophagia, cough, or abdominal pain—can be suggestive of esophageal or proximal gastric impaction, but symptom absence does not exclude significant pathology. Consequently, a pragmatic framework integrates age, symptom profile, and object features with early imaging to triage cases into three pathways: expectant management with structured observation; urgent endoscopic removal; or emergent intervention when airway compromise or hazardous objects are suspected.^{1,6,7}

MATERIALS AND METHODS

Present study was a prospective analysis of factors related with spontaneous passage of ingested foreign bodies in children. Children presenting with a history of foreign body ingestion were enrolled after fulfilling eligibility criteria. A total of 66 children were included in the study. Participants were recruited from the pediatric emergency and outpatient departments. Inclusion criteria comprised children with a confirmed or suspected ingestion of foreign bodies based on clinical history, radiological findings, or endoscopic visualization. Children with incomplete medical records, those lost to follow-up before confirmation of foreign body passage, and patients with underlying anatomical abnormalities of the gastrointestinal tract were excluded.

Methodology

Clinical data were collected using a predesigned structured proforma. Demographic parameters included age, sex, and residence (urban/rural). Clinical characteristics recorded were presenting symptoms (such as drooling, dysphagia, vomiting, abdominal pain, or cough), time since ingestion, type and nature of the ingested foreign body (sharp vs. blunt, metallic vs. non-metallic, radiopaque vs. radiolucent), and site of lodgement as confirmed by radiological imaging. Additional information regarding past medical history, previous similar episodes, and associated comorbidities was also documented.

Outcome Measures: The primary outcome was the spontaneous passage of the ingested foreign body without endoscopic or surgical intervention. Spontaneous passage was confirmed either by observation of the foreign body in the stool, radiological clearance on follow-up imaging, or resolution of symptoms with negative follow-up radiographs. Secondary outcome measures included the requirement of endoscopic retrieval, complications during the course of passage, and hospital stay duration.

Statistical Analysis: Data were entered into Microsoft Excel and subsequently analyzed using SPSS version 16.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were presented as mean $\pm$ standard deviation for continuous variables and frequencies with percentages for categorical variables. Associations between clinical parameters and spontaneous passage were tested using Chi-square or Fisher's exact test for categorical variables and independent sample t-test for continuous variables. A p-value of <0.05 was considered statistically significant.

Table 1: Demographic Characteristics of Study Participants (n=66)

Variable	Frequency (n)	Percentage (%)
Age Group	< 5 years	28
	5–10 years	26
	> 10 years	12
Sex	Male	38
	Female	28
Residence	Urban	41
	Rural	25

Table 2: Clinical Presentation of Children with Foreign Body Ingestion (n=66)

Symptom	Frequency (n)	Percentage (%)
Asymptomatic	15	22.73
Drooling	12	18.18
Dysphagia	10	15.15
Vomiting	8	12.12
Abdominal pain	11	16.67
Cough/Respiratory symptom	10	15.15

Table 3: Types and Nature of Ingested Foreign Bodies (n=66)

Type of Foreign Body	Frequency (n)	Percentage (%)
Nature		
Metallic	44	66.67
Non-metallic	22	33.33
Shape		
Sharp	18	27.27
Blunt	48	72.73
Radiological Property		
Radiopaque	52	78.79
Radiolucent	14	21.21

Table 4: Factors Associated with Spontaneous Passage of Foreign Body (n=66)

Variable		Spontaneous Passage (n=49, 74.24%)	Intervention Required (n=17, 25.76%)	p-value
Age Group	< 5 years	23 (82.14%)	5 (17.86%)	0.041*
	≥ 5 years	26 (68.42%)	12 (31.58%)	
Sex	Male	27 (71.05%)	11 (28.95%)	0.542
	Female	22 (78.57%)	6 (21.43%)	
Shape	Blunt	41 (85.42%)	7 (14.58%)	0.002*
	Sharp	8 (44.44%)	10 (55.56%)	
Radiological Property	Radiopaque	40 (76.92%)	12 (23.08%)	0.118
	Radiolucent	9 (64.29%)	5 (35.71%)	

*Significant p-values (<0.05)

Table 5: Complications and Outcome (n=66)

Outcome / Complication	Frequency (n)	Percentage (%)
Spontaneous passage	49	74.24
Endoscopic retrieval	14	21.21
Surgical removal	3	4.55
Complications		
Mucosal abrasion	7	10.61
Esophageal ulceration	3	4.55
Perforation	1	1.52

RESULTS

Demographic Characteristics: A total of 66 children were included in the study (Table 1). The majority of cases were observed in children younger than 5 years (42.42%), followed by those in the 5–10 year age group (39.39%), while children above 10 years accounted for only 18.18% of cases. Males were more commonly affected (57.58%) compared to females (42.42%), giving a male-to-female ratio of approximately 1.35:1. In terms of residence, children from urban areas comprised 62.12% of cases, whereas 37.88% were from rural backgrounds, suggesting a higher presentation of foreign body ingestion among urban dwellers.

Clinical Presentation: The clinical manifestations at presentation were variable (Table 2). About one-fifth of the children (22.73%) were asymptomatic at the time of evaluation, where the foreign body ingestion was only suspected by the caregiver. Among symptomatic children, drooling (18.18%) and dysphagia (15.15%) were the most common complaints, while abdominal pain (16.67%), cough/respiratory symptoms (15.15%), and vomiting (12.12%) were also observed. This highlights that while many children present with specific symptoms, a considerable proportion may remain asymptomatic despite ingestion.

Nature and Types of Foreign Bodies: The distribution of foreign bodies ingested is shown in Table 3. Metallic foreign bodies were the most frequently encountered, accounting for two-thirds of cases (66.67%), while non-metallic objects were ingested in 33.33% of cases. Blunt objects were predominant (72.73%), whereas sharp objects made up 27.27%. Radiological analysis revealed that most foreign bodies were radiopaque (78.79%), with radiolucent objects accounting for 21.21%. These findings indicate that blunt metallic and radiopaque objects constitute the majority of ingestions in children.

Factors Associated with Spontaneous Passage: The relationship between various factors and spontaneous passage of ingested foreign bodies is summarized in Table 4. Overall, 49 children (74.24%) experienced spontaneous passage, while 17 (25.76%) required either endoscopic or surgical intervention. Age was significantly associated with spontaneous passage ($p=0.041$), with children younger than 5 years demonstrating a higher rate of spontaneous clearance (82.14%) compared to those aged 5 years and above (68.42%). Gender did not show any significant association ($p=0.542$). Shape of the ingested foreign body was highly significant ($p=0.002$), with blunt objects more likely to pass

spontaneously (85.42%) than sharp ones (44.44%). Radiological property showed a trend but did not reach statistical significance ($p=0.118$), as radiopaque objects had a higher passage rate (76.92%) compared to radiolucent ones (64.29%).

Complications and Outcome: Final outcomes and complications are presented in Table 5. Spontaneous passage occurred in nearly three-fourths of the participants (74.24%). Endoscopic intervention was required in 21.21% of cases, while surgical removal was necessary in 4.55%. Complications were documented in 11 children (16.67%). The most common complication was mucosal abrasion (10.61%), followed by esophageal ulceration (4.55%), and a single case of perforation (1.52%). Importantly, most complications were minor and managed conservatively, with only one child experiencing a serious complication requiring surgical management.

DISCUSSION

In our cohort, children <5 years accounted for 42.42% and males for 57.58%, underscoring the classic toddler–male predominance. This aligns with Cheng *et al.* (1999), who reported a mean age of 5.2 years with preschoolers most at risk and coins the leading item (49%) in a series of 1,265 pediatric cases, emphasizing early childhood vulnerability to ingestion events.⁸

We observed 22.73% asymptomatic children; while drooling (18.18%) and dysphagia (15.15%) were common symptoms. A higher asymptomatic proportion has been described by Uyemura (2005), citing a retrospective review in which ~50% of children with confirmed ingestion were asymptomatic, highlighting the need for a high index of suspicion even without overt symptoms.⁹

Metallic objects comprised 66.67% in our study; most were blunt (72.73%) and radiopaque (78.79%). Kay and Wyllie (2005) similarly note that coins are the most frequent pediatric ingestion in Western settings and that the majority of objects are blunt, often permitting conservative management when location and patient factors are favorable.¹⁰

Our high proportion of radiopaque items (78.79%) is clinically useful because plain radiographs readily detect many metals and other dense materials. The ASGE practice guideline states that “the majority of ingested foreign bodies will pass spontaneously,” but also emphasizes radiographic evaluation and object characteristics (including radiopacity) to guide urgency and intervention—supporting our imaging-driven approach.¹¹

We observed spontaneous passage in 74.24%, endoscopic removal in 21.21%, and surgery in 4.55%. NASPGHAN’s clinical report summarizes typical distributions of 80–90% spontaneous passage, 10–20% endoscopic removal, and <1% surgery; our findings are comparable for endoscopy but show a modestly higher surgical rate, potentially reflecting our case-mix (e.g., sharp objects) or referral bias within a tertiary center.¹²

Children <5 years in our series had a higher spontaneous passage (82.14%) than those ≥5 years (68.42%, $p = 0.041$). For esophageal coins specifically, Waltzman *et al.* (2005) reported 25–30% spontaneous transit during a short observational window and recommended 8–16 h observation in selected cases—particularly older children and more distal locations—supporting age/location-sensitive observation policies that can influence passage likelihood.¹³

Shape mattered strongly in our data: blunt objects passed spontaneously in 85.42% vs 44.44% for sharp objects ($p = 0.002$).

Tokar *et al.* (2007) analyzed 161 pediatric removals and identified sharp objects among factors associated with complications, a finding consistent with our lower passage rates and higher intervention need when sharp items are involved.¹⁴

Overall complications were 16.67% in our series (mucosal abrasion 10.61%, ulceration 4.55%, perforation 1.52%). Broad pediatric reviews note that most ingestions are benign but can cause significant morbidity, especially with hazardous items; Passali *et al.* (2015) synthesized pediatric FB injury patterns and complications, reinforcing vigilance and early endoscopic management for higher-risk objects—echoing the pattern we observed.¹⁵

CONCLUSION

In this prospective observational study of 66 children, spontaneous passage of ingested foreign bodies was observed in the majority of cases, particularly among younger children and those with blunt objects. Shape and age were significant predictors of outcome, whereas sex and radiological properties showed no strong association.

Most complications were minor and managed conservatively, with few requiring endoscopic or surgical intervention. These findings emphasize the importance of individualized risk assessment to guide timely and safe management in pediatric foreign body ingestion.

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