

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

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ABSTRACT

Background: The ingestion of foreign objects is a prevalent issue in pediatrics, with over one lakh incidents reported annually. Hence, the present study was conducted to analyze various factors associated with spontaneous passage of ingested foreign bodies in children.

Materials & Methods: A total of 100 children under the age of 18 who had ingested foreign bodies were included in the study. Data were collected using a standardized form that captured demographic information, details of the foreign body ingestion, clinical presentation, and outcomes. The children were monitored for at least six months after the foreign body had either passed spontaneously or been retrieved. The study also defined constipation based on specific and employed a structured management protocol for gastric foreign bodies. Statistical analysis was performed to identify significant factors influencing the spontaneous passage of ingested foreign bodies.

Results: A total of 100 patients were evaluated. Mean age of the patients was 11.8 years. 66 percent of the patients were males while the remaining were females. 63 percent of the patients were of rural residence while the remaining was of urban residence. The average transit time for the spontaneous passage of foreign bodies was 135.9 hours. Children who ingested sharp objects experienced quicker passage compared to those who ingested blunt objects. The analysis of the Receiver Operating Characteristic (ROC) curve revealed that a diameter of 1.89 cm is the ideal cutoff point for predicting the

transit time of blunt foreign bodies exceeding 72 hours. In contrast, the study was unable to establish a reliable cutoff diameter or length for sharp foreign bodies to predict transit times exceeding 48 or 72 hours, highlighting the complexity and unpredictability of sharp object passage.

Conclusion: The management of foreign bodies in pediatric patients continues to be one of the most formidable challenges encountered by paediatricians. This issue is further complicated by the absence of prospective, multicenter studies that could offer a robust evidence foundation for the formulation of guidelines.

Key words: Foreign body, Spontaneous.

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INTRODUCTION

The ingestion of foreign objects is a prevalent issue in pediatrics, with over one lakh incidents reported annually. Most cases of pediatric ingestion are unintentional; however, the rate of intentional ingestions begins to rise during adolescence. In the United States, the most frequently ingested foreign bodies among children are coins, followed by various other items such as toys, toy components, sharp objects, batteries, bones, and food.^{1, 2} In both adolescents and adults, the most common form of accidental foreign body ingestion involves meat or food impactions. The

majority of food impaction cases are associated with esophageal pathology. The management of foreign body ingestions is contingent upon the type of object ingested, its location, and the age and size of the patient. Esophageal foreign bodies necessitate prompt intervention due to their potential to induce respiratory symptoms and complications, esophageal erosions, or even an aortoesophageal fistula. Batteries that become lodged in the esophagus require immediate endoscopic removal, even in asymptomatic patients, due to the elevated risk of complications.

The presence of sharp foreign bodies raises the complication rate of foreign body ingestion from below 1% to between 15% and 35%, with the exception of straight pins, which typically have a relatively benign outcome unless multiple pins are ingested.^{4, 5} The ingestion of magnets is becoming more common, attributed to their widespread availability and the misconception that they are harmless. However, ingesting multiple magnets poses a significant risk of obstruction, perforation, and the development of fistulas. Various methods for managing foreign bodies include the suture technique, the double snare technique, and the combined forceps/snare technique for long, large, and sharp objects, in addition to newer tools such as retrieval nets and specialized forceps.^{6, 7} Hence; the present study was conducted to analyze various factors associated with spontaneous passage of ingested foreign bodies in children.

MATERIALS & METHODS

A total of 100 children under the age of 18 were enrolled in the study. Those presenting with intestinal obstruction, perforation, peritonitis, esophageal foreign bodies, or a known history of gastrointestinal pathology or prior surgery were excluded from participation.

Data were gathered using a standardized proforma, which encompassed demographic information, details regarding foreign body ingestion, clinical presentation, investigations, interventions, and outcomes. The children were monitored for a minimum of 6 months following either the spontaneous passage or retrieval of the foreign body. Constipation was characterized by the presence of two or more of the following symptoms persisting for over 4 weeks: a defecation frequency of ≤ 2 times per week, faecal

incontinence occurring ≥ 1 time per week after the acquisition of toileting skills, excessive stool retention, painful or hard bowel movements, large-diameter stools causing obstruction in the toilet, or a palpable mass in the rectal or abdominal area. The management protocol for gastric foreign bodies (FBs) adhered to a structured methodology. FBs located beyond the stomach were treated conservatively, with intervention only in cases of obstruction or perforation. In asymptomatic patients, serial X-rays were conducted. The duration of passage was calculated from the time of ingestion to the moment of confirmed expulsion, as verified through stool inspection. Statistical analysis was performed utilizing SPSS Statistics, with univariate analysis conducted to assess the level of significance.

RESULTS

A total of 100 patients were evaluated. Mean age of the patients was 11.8 years. 66 percent of the patients were males while the remaining were females. 63 percent of the patients were of rural residence while the remaining was of urban residence. The average transit time for the spontaneous passage of foreign bodies was 135.9 hours. Children who ingested sharp objects experienced quicker passage compared to those who ingested blunt objects. The analysis of the Receiver Operating Characteristic (ROC) curve revealed that a diameter of 1.89 cm is the ideal cutoff point for predicting the transit time of blunt foreign bodies exceeding 72 hours. In contrast, the study was unable to establish a reliable cutoff diameter or length for sharp foreign bodies to predict transit times exceeding 48 or 72 hours, highlighting the complexity and unpredictability of sharp object passage.

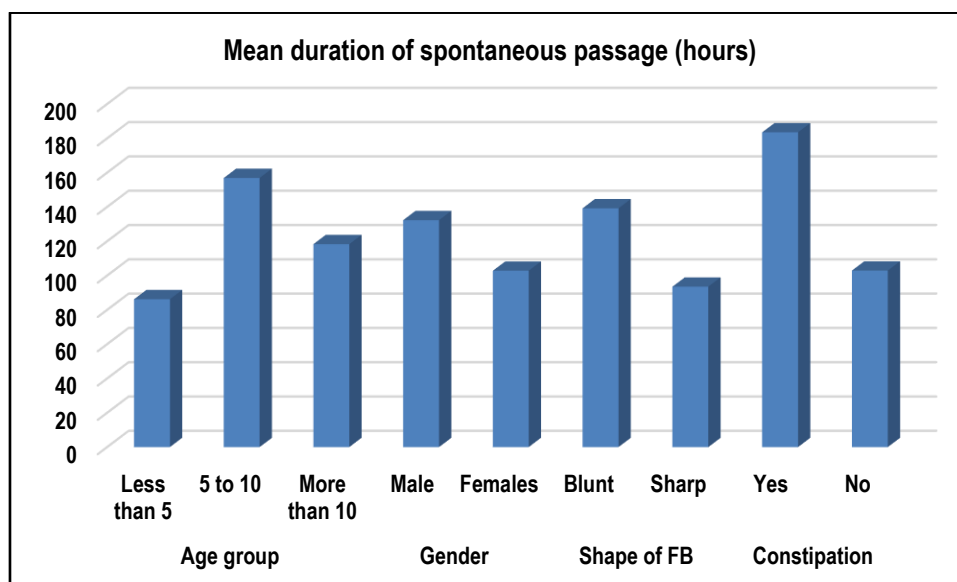
Table 1: Demographic data

Variable		Number	Percentage
Age group (years)	Less than 5	23	23
	5 to 10	38	38
	More than 10	39	39
Gender	Male	66	66
	Females	34	34
Residence	Rural	63	63
	Urban	37	37

Table 2: Variables

Variables		Mean duration of spontaneous passage (hours)	p-value
Age group	Less than 5	86.2	0.000*
	5 to 10	156.9	
	More than 10	118.3	
Gender	Male	132.3	0.001*
	Females	102.8	
Shape of FB	Blunt	139.2	0.021*
	Sharp	93.5	
Constipation	Yes	183.5	0.001*
	No	102.9	

*: Significant



Graph 1: Mean duration of spontaneous passage (hours)

DISCUSSION

Coins are the most prevalent type of ingested foreign object. Other items, such as toys and their components, sharp objects like needles and pins, batteries, chicken and fish bones, as well as food, each represent 5% to 30% of pediatric ingestions. In regions of Asia and other countries where fish is a major dietary element, the ingestion and impaction of fish bones are frequently observed in both children and adults. In these areas, coins rank as the second most common cause, while toys, needles, and various other objects also constitute significant causes. In adults, the leading cause of accidental "foreign body ingestion" in the United States is meat impaction, particularly among individuals with pre-existing esophageal conditions that may not be detected during endoscopy. Recently, eosinophilic esophagitis has emerged as a recognized contributing factor to impactions across all age groups.^{8,9} Initial management of witnessed or suspected ingestions should begin with a foreign body series of radiographs to identify the presence and location.¹⁰

A total of 100 patients were evaluated. Mean age of the patients was 11.8 years. 66 percent of the patients were males while the remaining were females. 63 percent of the patients were of rural residence while the remaining was of urban residence. The average transit time for the spontaneous passage of foreign bodies was 135.9 hours. Children who ingested sharp objects experienced quicker passage compared to those who ingested blunt objects. The analysis of the Receiver Operating Characteristic (ROC) curve revealed that a diameter of 1.89 cm is the ideal cutoff point for predicting the transit time of blunt foreign bodies exceeding 72 hours. In contrast, the study was unable to establish a reliable cutoff diameter or length for sharp foreign bodies to predict transit times exceeding 48 or 72 hours, highlighting the complexity and unpredictability of sharp object passage. Chong LW et al reviewed relevant literature from the PubMed database and the clinical presentations, diagnostic modalities, treatment strategies and outcomes of 88 reported cases were analyzed. The results showed that only 6 patients received conservative treatment with parenteral antibiotics, while the majority underwent either image-guided abscess drainage or laparotomy. Patients receiving abscess drainage via laparotomy

had a significantly shorter length of hospitalization compared with those undergoing image-guided drainage. There was no significant difference in age between those who survived and those who died, however, the latter presented to hospitals in a more critical condition than the former. The overall mortality rate was 7.95%.¹⁰

In the beginning of the 20th century, sharp objects were reported as one of the most commonly ingested foreign bodies. Safety pin and nail ingestions, 15% and 13%, respectively, accounted for the bulk of the sharp object ingestions in the United States. Partially because of the popularity of disposable diapers, ingestion of safety pins has significantly declined¹¹. During a 12-month prospective study, Paul et al reported that of 244 ingestions assessed by pediatric emergency room and paediatricians, 10% were defined as sharps and included straight pins, open safety pins, hairbrush bristles, and pine needles¹². Incidence rates between 11% and 13% were reported from European and Asian centers¹³⁻¹⁵. The frequency and the type of ingested sharps are greatly dependent on cultural factors. Esophageal fish bones are most frequently encountered in patients of Asian and Mediterranean descent, where it is customary to introduce fish into the diet at a young age¹⁶, whereas pin ingestions are higher in ethnic groups that use pins to fasten clothing or for religious or cultural beliefs.¹⁷

CONCLUSION

The management of foreign bodies in pediatric patients continues to be one of the most formidable challenges encountered by paediatricians. This issue is further complicated by the absence of prospective, multicenter studies that could offer a robust evidence foundation for the formulation of guidelines.

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