

# Diagnosis and Management of Ingested Foreign Bodies in Unusual Localizations: A Case Series

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## Abstract

**Background:** This study aimed to evaluate the clinical presentations associated with ingested foreign bodies located in unusual regions of the gastrointestinal tract and to highlight the diagnostic challenges and management strategies encountered in such cases. **Materials and Methods:** This retrospective study included 96 patients who presented to the Department of General Surgery at Van Yüzüncü Yıl University between January 2015 and December 2022 and were found to have foreign bodies in the gastrointestinal tract outside the esophagus and stomach. Demographic and clinical characteristics, type and localization of the foreign body, diagnostic methods, treatment approaches, and clinical outcomes were analyzed. Direct radiography and computed tomography were used for diagnostic evaluation. Treatment strategies were determined according to the patient's clinical condition and included conservative follow-up, endoscopic removal, or surgical intervention. **Results:** The most common presenting symptoms were abdominal pain (52.1%) and nausea or vomiting (34.4%). Foreign bodies were most frequently located in the terminal ileum (31.3%) and jejunum (22.9%). Metallic objects (28.1%) and bone fragments (22.9%) were the most commonly identified foreign bodies. Conservative management was applied in 40.6% of cases, endoscopic removal in 21.9%, and surgical intervention in 37.5%. Among surgically treated patients, the most common indications were perforation (44.4%) and mechanical obstruction (30.6%). No mortality occurred, and the early complication rate was 14.6%. **Conclusions:** Foreign bodies located in unusual gastrointestinal sites may present with atypical symptoms and lead to delayed diagnosis. Early recognition and timely intervention remain essential for reducing morbidity and preventing complications.

**Keywords:** Foreign body ingestion, Endoscopic management, Surgical intervention, Intestinal obstruction

## 1. Introduction

Ingested foreign bodies are a common clinical scenario in general surgical practice, with most cases passing spontaneously through the gastrointestinal tract under conservative management<sup>1</sup>. However, depending on the type, size, shape of the ingested object,

and its location within the gastrointestinal system, serious complications may occur, sometimes necessitating surgical intervention<sup>2</sup>. Although the majority of cases in the literature are reported to follow an uncomplicated course, approximately 10–20% of patients require endoscopic or surgical intervention<sup>3</sup>.

One of the most critical factors in evaluating ingested foreign bodies in general surgery is the location of the object. Unlike classical locations such as the esophagus and stomach, foreign bodies located in distal small bowel segments or atypical intra-abdominal sites can present complex clinical challenges in diagnosis and management<sup>4</sup>. Such unusual localizations are particularly associated with severe complications, including perforation, mechanical bowel obstruction, abscess formation, and injury to adjacent organs<sup>5</sup>.

Imaging findings play a pivotal role in surgical decision-making during the diagnostic process. While plain radiographs are typically used as the first-line assessment, computed tomography (CT) provides higher diagnostic accuracy for radiolucent foreign bodies or cases with suspected complications<sup>6</sup>. In general surgical practice, CT findings are critical for determining surgical indications, especially in patients with suspected perforation or intra-abdominal sepsis<sup>7</sup>.

Surgical management of foreign bodies is guided by the patient's clinical status, the presence of complications, and the object's potential to progress through the gastrointestinal tract. Surgery becomes unavoidable in patients presenting with an acute abdomen, free air, peritonitis, or progressive obstruction<sup>8</sup>. Sharp foreign bodies located in the terminal ileum and small bowel carry a particularly high risk of perforation, often necessitating surgical exploration<sup>9</sup>.

Cases of foreign bodies in unusual locations frequently present with atypical symptoms, and patients often cannot clearly recall a history of ingestion, leading to diagnostic delays<sup>10</sup>. This underscores the need for heightened clinical awareness and a multidisciplinary approach among general surgeons. Sharing surgical experiences serves as a guide in the diagnosis and management of these rare cases.

This study aims to evaluate the clinical presentations of ingested foreign bodies in unusual locations from a general surgical perspective, focusing on the diagnostic challenges and surgical management strategies, supported by a review of the literature.

## 2. Materials and Methods

This study was designed as a retrospective case series to evaluate the diagnosis and management of ingested foreign bodies located in unusual anatomical sites. Patients who presented with a diagnosis of ingested foreign body to the Department of General Surgery at Van Yüzüncü Yıl University between January 2015 and December 2022 were retrospectively reviewed. A total of 96 patients meeting the inclusion criteria were enrolled in the study.

Patients with foreign bodies located outside the esophagus and stomach were included. Unusual localization was defined as foreign bodies situated in the distal duodenum, small bowel, colon, or intra-abdominal cavity. Cases involving classical locations (esophagus or stomach), incomplete clinical or radiological records, or unverified diagnosis or management of the foreign body were excluded.

Demographic and clinical data, including age, sex, presenting symptoms, type and localization of the foreign body, diagnostic methods, treatment approaches, and clinical outcomes, were collected from patient files and the hospital information management system. All patients underwent a detailed physical examination upon presentation. Plain radiographs were performed according to clinical indications, and computed tomography (CT) was used in cases of suspected complications or radiolucent foreign bodies.

Radiological assessments included evaluation of foreign body location, gastrointestinal wall integrity, obstruction signs, and potential complications.

The treatment strategy was determined based on clinical status, foreign body location, and the presence of complications. Clinically stable patients without signs of complications were managed conservatively. Patients indicated for endoscopic removal were referred to the relevant units. Surgical intervention was performed in cases of perforation, mechanical bowel obstruction, peritonitis, or intra-abdominal sepsis. Surgical procedures included foreign body removal, primary bowel repair, or segmental resection when necessary.

Postoperative follow-up included monitoring for early and late complications, hospital length of stay, morbidity, and mortality. The primary endpoint of the study was the evaluation of diagnostic and therapeutic approaches for foreign bodies in unusual locations. Secondary endpoints included the need for surgical intervention and clinical outcomes. Ethical approval was obtained from the of Van Yüzüncü Yıl University Non-Interventional Clinical Research Ethics Committee prior to the study (approval no: 2022/11-14, date: November 18, 2022). The study was conducted in accordance with the principles of the Declaration of Helsinki, and patient data were anonymized to maintain confidentiality. Due to the retrospective design, individual informed consent was waived by the ethics committee.

### 2.1. Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). The distribution of continuous variables was assessed using the Kolmogorov-Smirnov test and visual inspection of histograms. Normally distributed continuous variables were expressed as mean  $\pm$  standard deviation, while non-normally distributed variables were reported as median with minimum and maximum values. Categorical variables were presented as counts and percentages.

As this study was a retrospective case series, comparative hypothesis testing was not performed, and analyses were limited to descriptive statistics. Where appropriate, clinical outcomes were summarized descriptively in subgroups, but no inferential statistical comparisons were conducted. Data analysis and reporting adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

**Table 1. Demographic and clinical characteristics of the patients (n = 96)**

| Variable                                 | Value           |
|------------------------------------------|-----------------|
| Age (mean $\pm$ SD)                      | 41.7 $\pm$ 18.9 |
| Age range                                | 7–82            |
| Male, n (%)                              | 58 (60.4)       |
| Female, n (%)                            | 38 (39.6)       |
| Emergency department admission, n (%)    | 83 (86.5)       |
| Abdominal pain, n (%)                    | 50 (52.1)       |
| Nausea and vomiting, n (%)               | 33 (34.4)       |
| Signs of bowel obstruction, n (%)        | 21 (21.9)       |
| History of foreign body ingestion, n (%) | 26 (27.1)       |

Data are presented as numbers (percentages) unless otherwise stated.

Continuous variables are expressed as mean  $\pm$  standard deviation.

Abbreviations: SD, standard deviation.

### 3. Results

The demographic and clinical characteristics of the 96 patients included in the study are summarized in Table 1. Among the patients, 58 were male (60.4%), and 38 were female (39.6%). The mean age was  $41.7 \pm 18.9$  years, ranging from 7 to 82 years. A total of 83 patients (86.5%) were evaluated after presenting to the emergency department. The most common presenting symptom was abdominal pain, observed in 50 patients (52.1%), followed by nausea and vomiting in 33 patients (34.4%), and signs of mechanical bowel obstruction in 21 patients (21.9%). Only 26 patients (27.1%) clearly reported a history of foreign body ingestion at presentation.

Evaluation of foreign body localization in the gastrointestinal tract revealed the terminal ileum as the most frequent site. Terminal ileum was involved in 30 patients (31.3%), jejunum in 22 patients (22.9%), colon in 18 patients (18.8%), and distal duodenum in 14 patients (14.6%). Twelve patients (12.5%) had foreign bodies detected in a free intra-abdominal location. The detailed distribution of localizations is presented in Table 2.

**Table 2. Localization of foreign bodies in the gastrointestinal tract**

| Location                       | n (%)     |
|--------------------------------|-----------|
| Distal segment of the duodenum | 14 (14.6) |
| Jejunum                        | 22 (22.9) |
| Terminal ileum                 | 30 (31.3) |
| Colon                          | 18 (18.8) |
| Free intra-abdominal           | 12 (12.5) |

*Values are presented as a number (percentage).*

*Unusual localization was defined as foreign bodies located distal to the duodenum or within the intra-abdominal cavity outside the typical esophageal and gastric regions.*

Regarding the types of ingested foreign bodies, metallic objects were most common, identified in 27 patients (28.1%). Bone fragments were observed in 22 patients (22.9%), sharp objects such as toothpicks in 19 patients (19.8%), and plastic materials in 15 patients (15.6%). Other organic materials were detected in 13 patients (13.5%). Sharp foreign bodies were more frequently associated with complications when located in the small bowel.

All patients underwent physical examination. Plain abdominal radiography was performed in 74 patients (77.1%), and 69 patients (71.9%) underwent advanced imaging with computed tomography (CT). Perforation was identified in 16 patients (23.2%) evaluated by CT.

Treatment strategies are summarized in Table 3. Thirty-nine patients (40.6%) were managed conservatively, 21 patients (21.9%) underwent endoscopic removal, and 36 patients (37.5%) required surgical intervention. Indications for surgery included perforation in 16 patients (44.4%), mechanical bowel obstruction in 11 patients (30.6%), and intra-abdominal sepsis in 9 patients (25.0%).

Among surgically treated patients, primary bowel repair was performed in 18 patients (50.0%), segmental bowel resection in 12 patients (33.3%), and resection with anastomosis in 6 patients (16.7%). Early postoperative complications occurred in 14 patients (14.6%), most commonly surgical site infection and postoperative ileus. No mortality was observed.

The mean hospital stay for the overall study population was  $4.8 \pm 2.6$  days. Hospital length of stay was evaluated descriptively according to treatment approach; no inferential comparison between treatment groups was performed.

**Table 3. Treatment approaches and types of surgical interventions**

| Treatment approach     | n (%)     | Surgical intervention     | n (%)     |
|------------------------|-----------|---------------------------|-----------|
| Conservative follow-up | 39 (40.6) | Primary bowel repair      | 18 (50.0) |
| Endoscopic removal     | 21 (21.9) | Segmental resection       | 12 (33.3) |
| Surgical intervention  | 36 (37.5) | Resection and anastomosis | 6 (16.7)  |

Data are presented as a number (percentage).

Percentages for surgical procedures were calculated based on the total number of surgically treated patients.

### 3.1. Limitations

This study has several limitations. First, its retrospective design may have introduced selection bias and incomplete data recording. Second, being a single-center study may limit the generalizability of the findings to other institutions and populations. Although the number of patients is relatively high for a case series, subgroup analyses based on the type and location of foreign bodies were limited due to heterogeneity among cases.

Additionally, the absence of a control group precluded comparisons of different diagnostic and therapeutic approaches. Changes in diagnostic and treatment strategies over the long study period may have influenced clinical decision-making. Finally, the lack of long-term follow-up data for all patients limited the evaluation of late complications and long-term outcomes.

Despite these limitations, this study provides valuable clinical insights into the diagnosis and surgical management of foreign bodies located in unusual gastrointestinal localizations.

## 4. Discussion

This retrospective case series evaluates the clinical presentations, diagnostic processes, and management strategies of ingested foreign bodies located in unusual sites, in comparison with the existing literature. As reported, most ingested foreign bodies (80–90%) pass spontaneously through the gastrointestinal tract, approximately 10–20% require intervention, and fewer than 5% necessitate surgical treatment<sup>1,3,11</sup>. In our study, the rate of surgical intervention was 37.5%, slightly higher than standard literature rates, likely due to the inclusion of selected cases involving distal duodenum and intra-abdominal localizations<sup>4,5</sup>.

A male predominance (60.4%) was observed, and only 27.1% of patients provided a clear history of foreign body ingestion. This may contribute to diagnostic delays and increased risk of complications; literature also highlights that incomplete history in atypical locations can delay diagnosis<sup>10,12</sup>.

Imaging modalities play a critical role in the diagnostic process. In our series, 23.2% of patients evaluated with CT demonstrated perforation. CT has been reported to offer higher sensitivity than plain radiography for detecting radiolucent or deeply located foreign bodies<sup>6,7,13</sup>, supporting its priority in assessing high-risk or atypically localized cases<sup>14</sup>.

Regarding foreign body types, metallic objects (28.1%), bone fragments (22.9%), and sharp objects (19.8%) were most common. Sharp objects, particularly in the distal small intestine, markedly increased the risk of perforation and obstruction<sup>5,8,13,15</sup>. Our findings similarly demonstrated higher complication rates and surgical requirements for these objects in distal small bowel locations.

Endoscopic management is recognized as safe and effective in appropriate cases, with success rates exceeding 90% for upper gastrointestinal foreign bodies<sup>7,10,16–18</sup>. In our

series, endoscopic removal was performed in 21.9% of patients, lower due to limited access to the distal small bowel and colon.

Surgical indications included perforation (44.4%), mechanical obstruction (30.6%), and intra-abdominal sepsis (25.0%). Most surgically treated patients underwent primary repair or segmental resection, consistent with literature reports of safe and effective interventions<sup>9,19,20</sup>. High perforation risk in the terminal ileum and distal small intestine aligns with prior findings<sup>5,19</sup>.

Low early postoperative complication rates and absence of mortality highlight the effectiveness of timely diagnosis and intervention. Literature confirms that diagnostic delays increase morbidity and mortality<sup>6,14</sup>.

Limitations include retrospective design, single-center data, and lack of long-term follow-up. Subgroup analyses were restricted to evaluating the impact of different foreign body types. Nonetheless, this study provides valuable clinical insights into the diagnosis and surgical management of foreign bodies in unusual gastrointestinal locations.

In summary, foreign bodies in atypical locations often present with nonspecific symptoms and unclear history. Sharp and large objects in the distal small intestine carry an increased complication risk and often require surgical intervention. CT is critical for diagnosis and surgical planning, while endoscopic and conservative approaches provide safe and effective management in appropriate cases. These findings underscore the importance of diagnostic vigilance, a multidisciplinary approach, and evidence-based treatment strategies.

## 5. Conclusion

Foreign bodies in unusual gastrointestinal locations typically present with atypical symptoms, potentially leading to diagnostic delays and an increased risk of serious complications. Sharp objects in the distal small intestine and foreign bodies associated with perforation, obstruction, or intra-abdominal sepsis frequently require surgical intervention, whereas endoscopic removal may be appropriate in anatomically accessible cases. Our study provides clinical evidence supporting individualized conservative, endoscopic, and surgical approaches for managing atypically located foreign bodies. Early diagnosis, appropriate imaging, and timely intervention are critical to reducing morbidity. Multidisciplinary management and optimized treatment strategies may improve patient outcomes and provide a basis for future research.

**Informed Consent:** Due to the retrospective design of the study and the use of anonymized patient data, the requirement for individual informed consent was waived by the ethics committee.

**Conflict of Interest:** The authors declare no conflicts of interest related to this study.

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