

## ORIGINAL ARTICLE

# Laparotomy for Ingested Foreign Body in Children: Nine Years Experience in A Tertiary Care Hospital

Kazi Md. Noor-ul Ferdous<sup>1</sup>, SM Mahmud<sup>2</sup>, Md. Delwar Hossain<sup>2</sup>, Nusrat Jahan Mona<sup>3</sup>, Sadia Sultan<sup>3</sup>, Umama Haq<sup>3</sup>, Ferdousi Akter<sup>3</sup>

### Abstract

**Background:** Ingestion of foreign bodies in children is a common occurrence and can affect from harmless to life-threatening situations. While laparotomy for ingested foreign body, in children is generally safe and effective, it is more important to take steps to prevent foreign body ingestion in the first place.

**Objective:** The aim of this study was to evaluate the cases that underwent laparotomy for foreign body ingestion and the management of any complications.

**Methods:** This retrospective study was conducted in the Division of Paediatric Surgery, Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh from January 2013 to December 2022. Total 83 patients were admitted for ingestion of foreign body of which 32 foreign bodies were removed endoscopically and 40 patients expelled foreign bodies with defecation without any intervention. For the remaining 11 patients, laparotomy was performed and associated complications were managed accordingly.

**Results:** In this study, the average age of the children were 38.7 months, of which majority were male (81.8%). Common presenting symptoms were dysphagia, (18.2%), abdominal pain (45.5%), vomiting (27.3%), and fever (27.3%). Whereas, 36.4% were asymptomatic. The time interval between ingestion and treatment were about 56.5 hours. The primary indication for laparotomy was perforation (45.5%) and failed endoscopic removal (36.4%). Most ingested objects were magnets (36.4%), predominantly found in the jejunum and ileum (45.5%). The commonest per operative complication (81.8%) was intestinal obstruction. The average operation time was 68.4 minutes. Post-operative hospital stay was 7.5 days on average, with a 4.2-month follow-up. There were incidents of postoperative complications, with 18.2% experiencing postoperative ileus.

**Conclusion:** Careful follow up of children with Ingested foreign bodies specially sharp and pointed objects, is warranted for its occasional requirement of surgical intervention, predominantly due to failure of endoscopic removal or spontaneous passage. Multiple ingestion of magnets or a single button battery ingestion can lead to life threatening complications, requiring surgical intervention.

**Keywords:** Laparotomy, ingested foreign body, children.

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1. Associate Professor, Division of Paediatric Surgery, Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh.
  2. Assistant Professor, Division of Paediatric Surgery, Bangladesh Shishu Hospital & Institute. Dhaka, Bangladesh.
  3. Resident (Phase B), Division of Paediatric Surgery, Bangladesh Shishu Hospital & Institute. Dhaka, Bangladesh.

**Correspondence to:** Dr. Kazi Md Noor-ul Ferdous, Associate Professor, Division of Paediatric Surgery, Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh. Cell: +8801711322487, E-mail: kmnferdous@gmail.com

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## Introduction

Due to lack of oral orientation beyond the age of six months, young toddlers frequently put unfamiliar objects in their mouths.<sup>1</sup> Children, especially under the age of six, are more prone to FB injuries because of the lack of molar teeth, they tend to have a propensity for oral exploration, as to play when they eat, with poor swallowing coordination.<sup>2</sup> According to their eating patterns and societal traits, FB differs from country to country. Coins, batteries, and fish bones were the most frequent FB, according to the European Study on Foreign Bodies Injuries (ESFBI) research.<sup>2</sup> In a Bangladeshi study conducted by Alam et al<sup>3</sup>, the commonest foreign bodies were needles, nails, coins, button batteries, safety pins, hijab pins and etc. In another study by Chowdhury et al<sup>4</sup>, coin, pins, nails, and batteries were the commonest foreign bodies ingested by children. Males are more commonly affected than females. Although, it might vary depending on sociocultural factors, early intervention is necessary when metal (such as coins, paper clips, batteries, and needles) and non-metal (such as wooden and plastic toy pieces) objects are ingested.<sup>5-8</sup> Patients might appear with no symptoms or serious issues such as erosions, ulcers, or perforations that require immediate medical management.<sup>9</sup> Foreign bodies may also be accidentally discovered during radiological assessment done for unrelated conditions, such as dysphagia, wheezing, pneumonia, or asthma.<sup>5,7</sup> Although it has been reported that between 80% and 90% of foreign bodies that are ingested pass through the gastrointestinal canal on their own without any complications, in 10-20% of cases, the foreign body may remain in anatomically restricted areas, primarily the upper esophageal region, the pylorus, the ileocecal valve, and the rectosigmoid colon, necessitating endoscopic removal; in 1% of cases, surgical removal may become a necessity.<sup>5-8</sup> Although most foreign bodies may spontaneously pass along the GI system, a few may require endoscopic or surgical removal is necessary. Yet, there is still debate regarding the circumstances which require the need for operative intervention. Admittedly, >90% of esophageal FBs pass naturally without causing problems; nevertheless, a small number of FBs can't readily pass via the pylorus, stomach, duodenum, ileocecal valve, Meckel's diverticulum, and/or anus, thus 10% of swallowed FBs may remain in the GI tract.<sup>10-12</sup> The key to

minimize any harmful repercussions is early diagnosis and effective care. The choice of the method of management for an ingested foreign body typically depends on the doctor's experience, other various factors, such as the patient's age, the nature and location of the foreign body, the time that has passed since ingestion, the patient's prior medical and surgical history, and the availability of medical techniques like endoscopy, should be also be taken into consideration.<sup>13</sup> This present study was conducted to evaluate the cases of ingested foreign body in children who underwent laparotomy for removal and the management of complications. So this study was undertaken to evaluate the cases of ingested foreign body in children who underwent laparotomy for foreign body removal and to manage the associated complications.

## Materials and Methods

This retrospective study was conducted in the Division of Paediatric Surgery, Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh, from January 2013 to December 2022. Total 83 patient admitted within this period for ingestion of foreign body of which 32 foreign bodies were removed endoscopically and 40 patients expelled the foreign bodies with defecation. For the remaining 11 patients, laparotomy were performed for removal of foreign bodes. Plain x-ray of abdomen were advocated in all cases. Patients aged between 2 months to 60 months undergone laparotomy for ingested foreign body were included in this study.

## Results

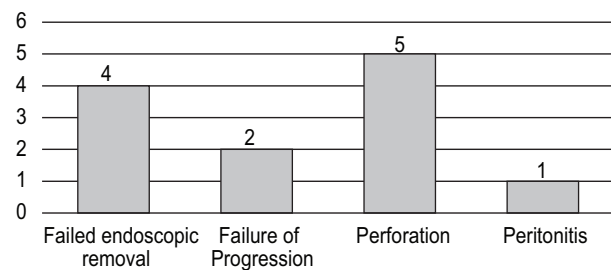
Table-I presents the baseline characteristics of the study cases. The average age of the children was 38.7 months (about 3.2 years) with a standard deviation of 11.2 months. The ages ranged from as young as 2 months to as old as 12 years. The majority of the study subjects were male, accounting for 81.8% of the total 11 study cases, while there were only 2 female, representing 18.2% of the total. The most common symptom was abdominal pain, experienced by 5 children (45.5% of subjects). This was followed by vomiting and fever, each of which were experienced by 3 children (27.3% of subjects). Dysphagia was a symptom in 2 cases (18.2% of subjects) and interestingly, 4 children (35.4%) were asymptomatic, showing no overt signs of having ingested a foreign body. On average, the time from ingestion to the detection and treatment of the

foreign body was approximately 56.5 hours, with a standard deviation of 17.2 hours. Figure 1 provides reasons for performing laparotomy in children who swallowed foreign bodies.

The most common reason for laparotomy was perforation, accounting for 45.5% of the cases. This was closely followed by failed endoscopic removal, which was the reason in 36.4% of the cases. Failure of progression contributed to 18.2% of the laparotomy indications, while peritonitis was the least common indication, representing 9.1% of the cases. Table-II describes the characteristics of the foreign bodies ingested by the children in the study. The most commonly ingested foreign body was magnet, which accounted for 36.4% of the cases. The second most common was button battery, representing 27.2% of the cases. Hijab pins were ingested in 18.2% of the cases, while both broken metallic rings and food objects were found in 9.1% of the cases for each type. The foreign bodies were located in various parts of the digestive system and peritoneal cavity. The jejunum ileum was the most common location, holding 45.4 of the foreign bodies. Both the cecum and large bowel and the peritoneal cavity each accounted for 18.2% of the locations. The stomach and duodenum each had 9.1% of the foreign bodies located within them. Table-III summarizes the Surgical observation and outcome in the study subjects. The most frequently observed per operative

finding was intestinal obstruction, which was present in 81.8% of the patients. Following this, gastrointestinal fistulae were identified in 63.6% of the cases.

The finding of bleeding was observed in 18.2% of the patients, and the presence of foreign bodies impacted within the lumen was noted in 27.3% of the cases. The average operation time was 68.4 minutes with a standard deviation of 10.6 minutes. Patients stayed in the hospital for an average of 7.5 ( $\pm 2.7$ ) days post-surgery and were followed up for an average of 4.2 ( $\pm 1.5$ ) months. The table also includes post-surgery complications. Out of 11, 2 patients (18.2%) experienced postoperative ileus. Surgical site infection, occurred in 1 case (9.1% each). Figure 2 shows the foreign body in CT scan of the abdomen. Figure 3 demonstrates the laparotomy performed on the children. Lastly, figure 4 shows example of some foreign body found after operation.



**Fig.-1** *Indications of laparotomy*

**Table I**  
*Baseline characteristics of the study subjects (N=11)*

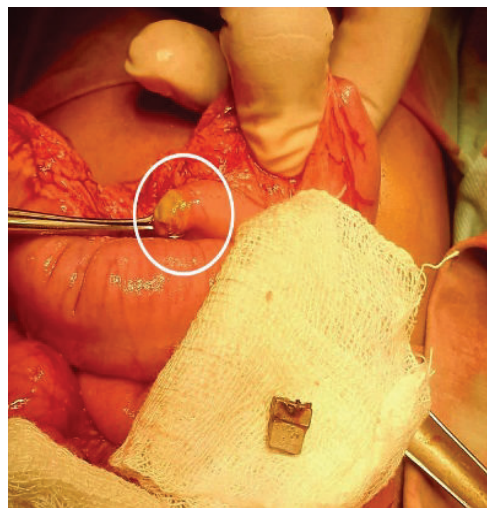
| Characteristics                          | n              | %                 |
|--|----------------|-------------------|
| Age (Month)                              | Mean $\pm$ SD  | 38.7 $\pm$ 11.2   |
|  | Range          | 2 months-12 years |
| Sex                                      | Male           | 9                 |
|  | Female         | 2                 |
| Symptoms                                 | Dysphagia      | 2                 |
|  | Vomiting       | 3                 |
|  | Abdominal pain | 5                 |
|  | Fever          | 3                 |
|  | Asymptomatic   | 4                 |
| Time of ingestion to presentation (Hour) | Mean $\pm$ SD  | 56.5 $\pm$ 17.2   |

**Table II**  
*Types of foreign bodies and their locations (N=11)*

| Characteristics                 |                       | n | %    |
|---------------------------------|-----------------------|---|------|
| Type of foreign bodies ingested | Broken metallic ring  | 1 | 9.1  |
|                                 | Button battery        | 3 | 27.2 |
|                                 | Hijab pin             | 2 | 18.2 |
|                                 | Magnet                | 4 | 36.4 |
|                                 | Food object           | 1 | 9.1  |
| Location of foreign body        | Stomach               | 1 | 9.1  |
|                                 | Duodenum              | 1 | 9.1  |
|                                 | Jejunum ileum         | 5 | 45.4 |
|                                 | Cecum and large bowel | 2 | 18.2 |
|                                 | Peritoneal cavity     | 2 | 18.2 |

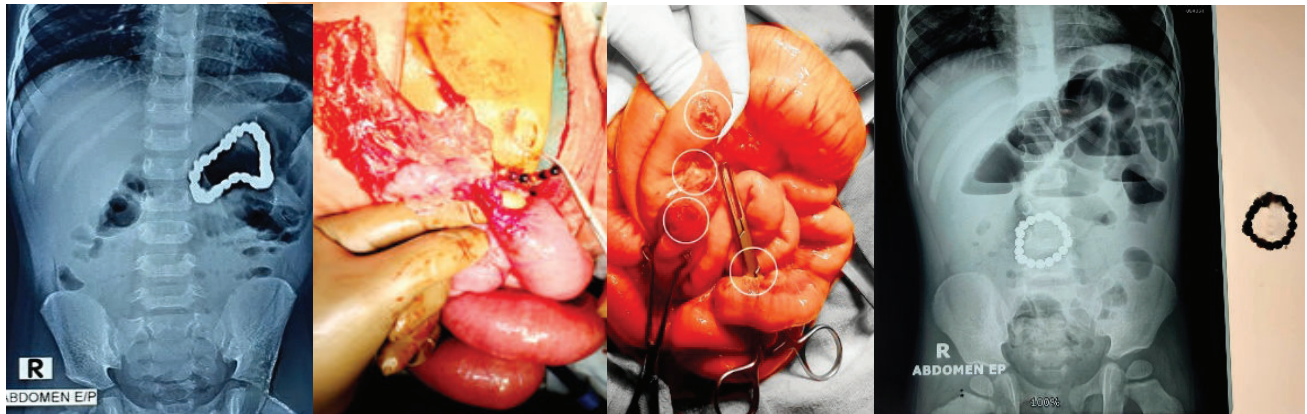
**Table III**  
*Surgical observation and outcome (N=11)*

| Outcome                       |                           | n               | %    |
|-------------------------------|---------------------------|-----------------|------|
| Per operative findings        | Bleeding                  | 2               | 18.2 |
|                               | Gastrointestinal fistula  | 7               | 63.6 |
|                               | Intestinal obstruction    | 9               | 81.8 |
|                               | Impacted within the lumen | 3               | 27.3 |
| Operation time                | Mean $\pm$ SD             | 68.4 $\pm$ 10.6 |      |
| Length of hospital stay (Day) | Mean $\pm$ SD             | 7.5 $\pm$ 2.7   |      |
| Follow up (Month)             | Mean $\pm$ SD             | 4.2 $\pm$ 1.5   |      |
| Post-operative complication   | Postoperative ileus       | 2               | 18.2 |
|                               | Surgical site infection   | 1               | 9.1  |

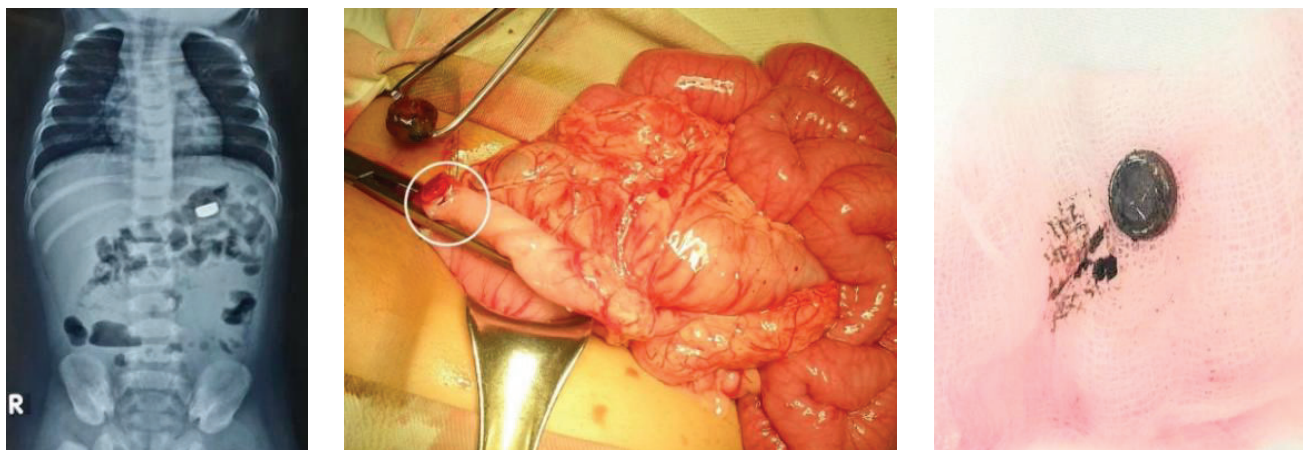


**Fig.-2** Multiple magnates ingestion. 2 pieces removed endoscopically. 3 pieces removed from laser sac after laparotomy





**Fig.-3** Multiple magnates (17) ingestion. Gut perforation in multiple site



**Fig.-4** Button battery ingestion



**Fig.-5** Multiple button battery and Impacted foreign body in the small intestine, Caecum and transverse colon

## Discussion

This study has shed light on the prevalence and management of ingested foreign bodies in children, a problem that frequently arises in pediatric care. The average age of children in this study was 38.7 months, echoing previous research that showed children around the age of three to be most at risk of foreign body ingestion due to their exploratory behavior and lack of mastication skills.<sup>14</sup> With a male preponderance (81.8%), our findings concur with past literature suggesting that boys are more likely to ingest foreign bodies than girls.<sup>15</sup> The presenting symptoms, included dysphagia, vomiting, abdominal pain, and fever, align with those reported in previous studies, emphasizing the potential severity of foreign body ingestion.<sup>16</sup> It is noteworthy that 36.4% of our study subjects were asymptomatic, reinforcing the challenges clinicians face in diagnosing this condition, as children often fail to report or recall the ingestion.<sup>17</sup> The predominance of magnets (36.4%) in this study, present a significant risk, particularly when multiple magnets are ingested and attract through the intestinal walls.<sup>18</sup> In this study, multiple magnet ingestion caused fistula in the study subject, as they stuck together by magnetic force. Button batteries were found in 27.3% among the ingested foreign bodies in our study, is also concerning due to their potential to cause serious complications, such as burns and perforations.<sup>19</sup> Button batteries which are able to pass duodenum caused perforation in our study patients. The less common items, including hijab pins, broken metallic ring, and food object, are consistent with objects reported in other studies.<sup>20</sup> In this study, common location of foreign body lodgment, was for the small bowel, which aligns with the existing literature emphasizing the small bowel, and specifically, the ileocecal valve, as a common site of impaction.<sup>21</sup> The most common indication for laparotomy was failed endoscopic removal, which is consistent with practice guidelines that recommend endoscopic removal as the first-line treatment for ingested foreign bodies that fail to pass spontaneously.<sup>22</sup> However, failure to progress, perforation, and peritonitis also necessitated surgical intervention, emphasizing the potential severity of these cases. For per operative findings, intestinal obstruction was the predominant

complication, present in a significant 81.8% of cases. This high rate aligns with previous studies which have documented the intestines as the most common location for foreign body impaction, due to the narrowing and tortuosity of the gastrointestinal tract.<sup>23</sup> Gastrointestinal fistulae were observed in 63.6% of cases. The formation of fistulae due to foreign bodies has been previously reported, suggesting that sharp or pointed objects are particularly predisposed to creating such traumatic perforations.<sup>24</sup> The foreign bodies may migrate and erode through the walls of the gastrointestinal tract, leading to fistula formation. While bleeding was a relatively less common finding in this study, occurring in 18.2% of cases, it remains clinically significant. The risk of bleeding is compounded when sharp objects cause direct injury or when corrosive agents produce mucosal erosions.<sup>25</sup> The average operation time and length of hospital stay in this study were within the ranges reported in other studies on pediatric foreign body ingestion, which may vary depending on the complexity of the case and the child's overall health.<sup>26</sup> This suggests that although the procedure requires precision, it is fairly straightforward for seasoned surgeons. An average post-operative hospital stay of 7.5 days, with a follow-up of 4.2 months, indicates the critical nature of ingested foreign bodies and the meticulous post-operative care they demand. Complications following surgery, such as postoperative ileus and surgical site infection, underscore the risk associated with foreign body ingestion and the need for prompt, effective treatment. These findings are similar to other studies.<sup>27,28</sup>

## Conclusion

Careful follow up of children with Ingested foreign bodies specially sharp and pointed objects, is warranted for its occasional requirement of surgical intervention, predominantly due to failure of endoscopic removal or spontaneous passage. Multiple ingestion of magnets or a single button battery ingestion can lead to life threatening complications, requiring surgical intervention. Steps to raise awareness of parents regarding, the dangers of handling small magnets and button battery by children, should be taken to prevent any future adversity.



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