International Journal of Biomedicine 16(1) (2026) 116-119
http://dx.doi.org/10.21103/Article16(1)_CR3

CASE REPORT

INTERNATIONAL JOURNAL OF BIOMEDICINE

Clinical Features, Diagnosis, and Surgical Management of Multiple Magnetic Foreign Bodies of the Gastrointestinal Tract in Children (Based on a Clinical Case)

J. A. Djurayev[1,2*], A. A. Ismatov[3], D. R. Asadullayev[2], Sh. Z. Nizamxodjayev[2], M. A. G'aniyev[1], R. N. Ismailova[2], P. K. Sultanov[4,3]

[1]*Republican Scientific Center of Emergency Medical Care, Tashkent, Uzbekistan*
[2]*Kimyo International University in Tashkent, Tashkent, Uzbekistan*
[3]*Republic Specialized Scientific-Practical Medical Center of Nephrology and Kidney Transplantation, Tashkent, Uzbekistan*
[4]*Tashkent State Medical University, Tashkent, Uzbekistan*

Abstract

Magnetic foreign bodies of the gastrointestinal tract (GIT) in children represent a rare but hazardous type of foreign body, capable of causing severe complications such as multiple perforations and inter-intestinal fistulas. In recent years, their incidence has increased due to the widespread use of magnetic toys and construction sets. Diagnosis is particularly challenging, as parents are not always aware of the ingestion, and the clinical presentation may mimic other acute surgical conditions. The article presents a clinical case of a 1.5-year-old boy who ingested 5 magnetic beads, complicated by fistula formation and perforation, as well as an analysis of data from the Republican Scientific Center of Emergency Medical Care (RSCEMC), in the Department of Pediatric Emergency Surgery for the period 2014–2019, describing the features of diagnosis, treatment strategies, and outcomes. (**International Journal of Biomedicine. 2026;16(1):116-119.**)

Keywords: gastrointestinal tract • foreign body • magnetic bead • children

For citation: Djurayev JA, Ismatov AA, Asadullayev DR, Nizamxodjayev ShZ, G'aniyev MA, Ismailova RN, Sultanov PK. Clinical Features, Diagnosis and Surgical Management of Multiple Magnetic Foreign Bodies of the Gastrointestinal Tract in Children (Based on a Clinical Case). International Journal of Biomedicine. 2026;16(1):116-119. doi:10.21103/Article16(1)_CR3

Introduction

Foreign bodies of the gastrointestinal tract (GIT) in children are one of the most common problems in emergency pediatric surgery. According to the American Association of Poison Control Centers, approximately 75% of the 116,000 registered cases of foreign body ingestion occur in children under 5 years of age.[1] Most objects (coins, buttons, small toys) pass through the gastrointestinal tract on their own. However, batteries and magnets pose a particular threat. Unlike other foreign bodies, magnets can attract each other through the intestinal wall, leading to localized ischemia, necrosis, fistula formation, and perforations.[2,3] According to the Republican Scientific Center of Emergency Medical Care (RSCEMC), in the Department of Pediatric Emergency Surgery, during the period 2014–2019, an increase in the number of children with magnetic foreign bodies was noted, reaching 3% of all cases of foreign bodies, while more than 51.8% of them required surgical intervention.[4]

This study aimed to examine the clinical manifestations, diagnostic approaches, and surgical outcomes of children with multiple magnetic foreign bodies in the gastrointestinal tract, using the clinical case and RSCEMC data.

Case Presentation

A 1.5-year-old female patient was admitted to the Department of Pediatric Emergency Surgery with complaints of abdominal pain, repeated vomiting, anxiety, and general

***Corresponding author**: Dr. Jur'atbek A. Djurayev, PhD. E-mail: juratbek07djurayev@gmail.com*

weakness. According to the mother, the child had been ill for about 10 days. The illness began with restlessness and crying when the abdomen was palpated, then progressed to nausea and repeated vomiting. Initially, the patient was treated at an infectious disease hospital, where infusion therapy was administered without improvement. An abdominal X-ray revealed multiple metallic shadows, and the child was transferred to a specialized pediatric emergency surgery center.

Clinical Findings and Investigations

The child's general condition is moderate, approaching serious. The child is lethargic. Body temperature is 36.7°C. The abdomen is soft, diffusely painful upon palpation, without symptoms of peritoneal irritation. Stool has not passed for two days.

Plain abdominal radiography revealed fluid levels in the small bowel loops and five rounded metallic shadows consistent with magnetic foreign bodies (Figure 1). Ultrasound examination revealed moderate dilation of the small intestinal loops, thickening of their walls, weakening of peristalsis and the presence of a small amount of free fluid. (Figure 2). In complete blood count tests over time showed minor fluctuations in hemoglobin (118→100 g/L), moderate leukocytosis up to 9.2×10⁹/L, without a shift in the leukocyte formula.

Biochemical parameters were within the age-appropriate range, with the exception of a transient increase in glucose (15.5 mmol/L) and urea (16.3 mmol/L) upon admission, which returned to normal levels after fluid therapy. Urinalysis revealed no abnormalities.

Fig 1. *Plain radiography of the abdominal organs.*

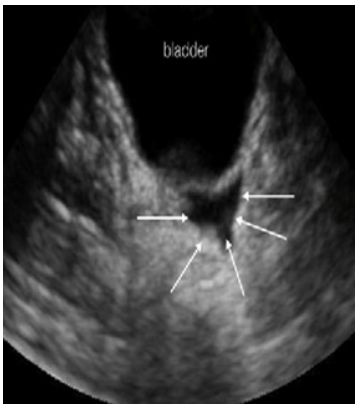

Fig 2. *Ultrasound of the abdominal organs.*

Surgical Treatment and Postoperative Course

Taking into account the clinical signs of intestinal obstruction, imaging data, and the high risk of perforation, a decision was made to perform emergency surgery. A mid-lower laparotomy was performed. Examination revealed dilated small bowel loops and serous effusion in the abdominal cavity. At a distance of approximately 30 cm from the ligament of Treitz, adhesions were found between loops of the small intestine, which arose as a result of the attraction of several magnetic foreign bodies located in different loops of the small intestine. Also, at this level of the proximal loop of the small intestine, there is a microperforation of the small intestine, which was sutured with a double-row suture. At a level of 40 cm from the Treitz ligament, two longitudinal perforations were detected, due to which a resection of a section of the small intestine approximately 10 cm long was performed with the formation of a side-to-side ileoileal anastomosis. Five magnetic foreign bodies were removed from the distal small intestine through a separate enterotomy. The abdominal cavity was debrided and drained (Figures 3-6).

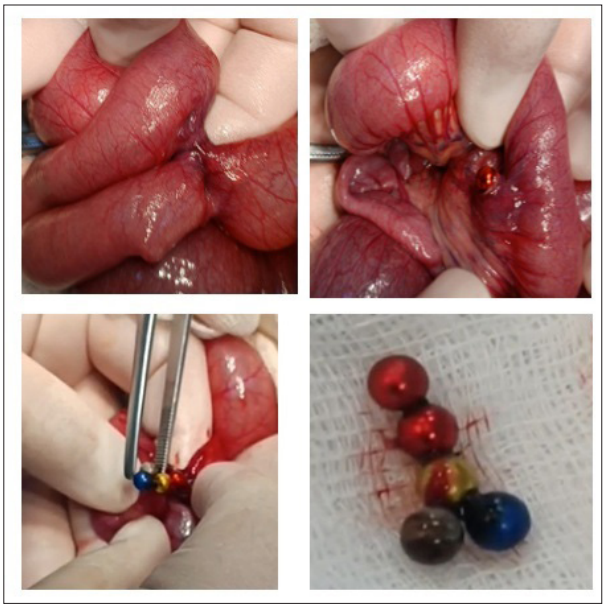

Fig. *3,4,5,6. Intraoperative picture.*

The postoperative course was uneventful. The patient received antibiotics and intravenous fluids, and nutrition gradually recovered. Bowel movements returned on the fourth postoperative day. The drains were removed 5–7 days after surgery. The postoperative wound healed by primary intention.

Discussion

Magnetic foreign bodies constitute a small proportion of all foreign bodies in the gastrointestinal tract in children, but they are characterized by the most severe course and the highest frequency of complications.[2,5] Late presentation, due to the lack of a reliable anamnesis and non-specific symptoms, significantly increases the risk of perforations and interintestinal fistulas.[3,6] According to several authors, more

than 40% of patients with multiple magnets require surgical treatment,[4,7] which is consistent with the presented clinical observation.

Between 2014 and 2019 alone, 1,046 children with gastrointestinal foreign bodies sought treatment at the RSCEMC. Patients ranged in age from 1 month to 18 years (mean age of 4.28±0.11 years). Depending on the time of treatment, the following were distinguished: urgent (<2 hours from symptom onset), emergency (2–24 hours), and late (>24 hours). According to the Russian Scientific Center for Emergency Medicine, only 25% of children with magnetic objects were admitted within the first day after swallowing, while the majority (75%) were admitted later than 24 hours (Figure 7). These results are comparable with the data of Singh et al.,[5] where late presentation for magnetic foreign bodies was observed in 68% of patients. Similar results are reported by Kim et al.,[6] indicating that it is the delay in treatment that is directly related to the high incidence of perforations.

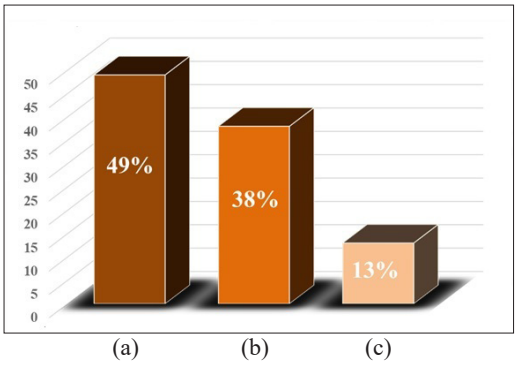

Fig. 7. *Time of admission: (a))urgence, (b) emergency, (c) late*

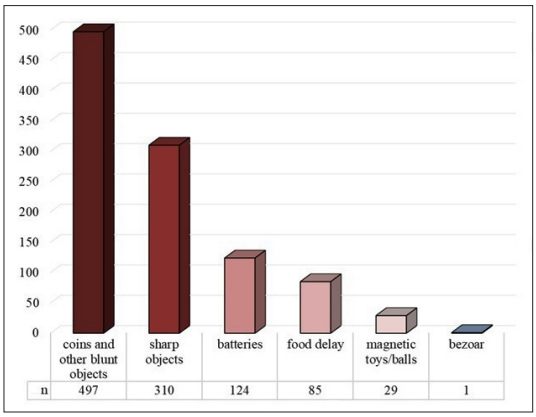

Fig. 8. *Frequency of gastrointestinal foreign bodies in children (according to the RSCEMC).*

Among all foreign bodies in children, blunt objects predominated - 497 (47%), sharp objects were found in 310 (30%), batteries - 124 (12%), magnets - 29 (3%), phytobezoar-1 (0.1%). Of these, magnetic objects were diagnosed in 3% of cases. Magnets were the most common cause of complications requiring open surgery (Figure 8).

Clinical manifestations at admission in children with magnetic foreign bodies of the gastrointestinal tract (n=29) were characterized by dysphagia, detected in 11 patients (38%), predominantly when the magnets were localized in the esophagus; vomiting in 9 children (31%), more often when foreign bodies were retained in the stomach or in the presence of early signs of intestinal obstruction; nausea in 8 patients (28%), frequently combined with vomiting and reflecting irritation of the mucosal lining; hypersalivation in 7 children (24%), mainly associated with difficulty in the passage of food through the esophagus (Figure 9).

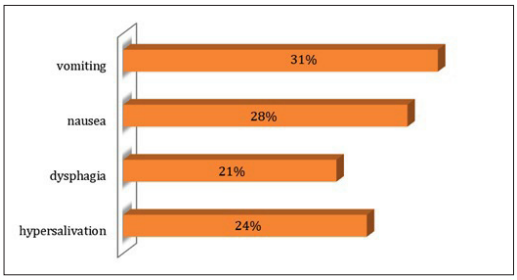

Fig. 9. *Clinical symptoms.*

These symptoms reflect both the mechanical impact of magnets and developing complications (swelling, inflammation, disruption of food passage). These data are consistent with the results of the study by Brown et al.,[3] in which most patients with magnets had predominant symptoms of swallowing disorders and vomiting, and pronounced signs of peritoneal irritation appeared only when complications developed. It is important to note that the initial symptoms often mimicked infectious diseases, which in some cases led to children being erroneously referred to infectious disease hospitals.

These patients underwent standard diagnostic methods: plain radiography of the chest and abdominal organs, radiocontrast examinations of the gastrointestinal tract, ultrasound, and multispiral computed tomography. When necessary, EGDS and colonoscopy were performed. Plain abdominal and chest radiography remains the gold standard for diagnosis, allowing the detection and quantification of metallic objects. However, the key difficulty is recognizing magnets, as they can form a single conglomerate and be mistaken for a single object. In our practice, the presence of free fluid on ultrasound and an increase in CRP to>100 mg/L were important predictors of a complicated course. According to Abbas et al.,[7] the combination of radiography and ultrasound increases the accuracy of diagnosing complications to 85%.

In total, endoscopic treatment was performed in 711 children (68%), of which endoscopic retraction was performed in 96.2% of cases, endoscopic fragmentation in 1.8%, and push-through in 2%. Our data are confirmed by Litovitz et al.,[1] where endoscopy was effective mainly with single magnets in the stomach (Table 1).

In our series, 51.8% of patients with magnetic foreign bodies required open surgery, in some cases with bowel resection. The relatively low rates of surgical intervention for coins and other blunt objects (less than 5%) highlight the exceptional danger posed by magnets. In a similar study

by Butterworth et al.,[2] surgical tactics were used in 43% of patients with magnets, which is generally comparable to our results.

Table 1.

Treatment methods for foreign bodies in the gastrointestinal tract in children (n = 1046).

Type of treatment	Magnetic foreign bodies n (%)	Other foreign bodies n (%)	n (%)
Endoscopic treatment	6 (20.7%)	705 (69.3%)	711 (68.0%)
Dynamic observation	5 (17.2%)	288 (28.3%)	293 (28.0%)
Laparoscopic surgery (with video assistance)	3 (10.3%)	12 (1.18%)	15 (1.43%)
Open surgical treatment	15 (51.7%)	12 (1.18%)	27 (2.58%)
Total	29 (100%)	1017 (100%)	1046 (100%)

In the general group of foreign bodies, open surgeries were performed in 27 children (2.58%), with the largest proportion of surgical interventions observed in patients with magnetic foreign bodies – more than half of them required laparotomy. At the same time, in cases of coins and other blunt objects, surgical treatment was required in less than 5% of cases.

Thus, our data and literature reviews demonstrate that magnetic foreign bodies constitute a distinct category with an extremely unfavorable prognosis when presented late. Early diagnosis and vigilance by primary care physicians can significantly reduce the risk of severe complications and the need for extensive surgical interventions.

Conclusions

Magnetic foreign bodies in the gastrointestinal tract in children account for a small proportion of all cases (about 3%), but are characterized by a high frequency of complications, making them the most dangerous category of foreign bodies.

Most patients present late (more than 24 hours after ingestion), due to unreliable anamnesis and the non-specific clinical picture.

Clinical manifestations most often include dysphagia, vomiting, nausea, and hypersalivation, but in some cases, the symptoms mimic acute infectious diseases, which complicate early diagnosis.

Endoscopic removal of magnets is possible only in isolated cases with early presentation and localization in the upper gastrointestinal tract. In most cases, late detection requires laparotomy and resection of the affected intestinal segments.

Timely X-ray diagnostics and surgeon vigilance can reduce the risk of serious complications.

Active preventative work with parents is necessary: informing them about the risks of magnetic toys and the need for immediate medical attention if swallowing is suspected.

Competing Interests

The authors declare that they have no conflicts of interest.

References

1. Litovitz T, Whitaker N, Clark L, White NC, Marsolek M. Emerging battery-ingestion hazard: clinical implications. Pediatrics. 2010 Jun;125(6):1168-77. doi: 10.1542/peds.2009-3037. Epub 2010 May 24. PMID: 20498173.
2. Butterworth J, Feltis B. Toy magnet ingestion in children: revising the algorithm. J Pediatr Surg. 2007 Dec;42(12):e3-5. doi: 10.1016/j.jpedsurg.2007.09.001. PMID: 18082689.
3. Strickland M, Rosenfield D, Fecteau A. Magnetic foreign body injuries: a large pediatric hospital experience. J Pediatr. 2014 Aug;165(2):332-5. doi: 10.1016/j.jpeds.2014.04.002. Epub 2014 May 16. PMID: 24836391.
4. Djurayev JA, Ismatov AA, Ismailova RN, Nizamxodjayev ShZ, G'aniyev MA, Sultanov PK. Clinical Features, Diagnostic Methods, and Treatment Approaches for Meckel's Diverticulum in Children and Adolescents: Experience of One Center. International Journal of Biomedicine. 2025;15(4):679-684. doi:10.21103/Article15(4)_OA5
5. Singh SJ, McGuirt WF. Multiple magnet ingestion: a growing hazard. World J Surg. 2019;43:2012-2018.
6. Kim JH, Lee JS, Kim MJ. Gastrointestinal complications caused by multiple magnet ingestion. Pediatr Surg Int. 2020;36:1071-1077.
7. Abbas MI, OlivaHemker M, Choi J. Utility of imaging in pediatric foreign body ingestion. Clin Pediatr. 2021;60(3):150–156.