

## A Case of 2-Year-Old Child with Entero-Enteric Fistula Following Ingestion of 25 Magnets

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**Summary:** Introduction: Magnet ingestion usually does not cause serious complications, but in case of multiple magnet ingestion or ingestion of magnet with other metal it could cause intestinal obstruction, fistula formation or even perforation. Case report: We report case of intestinal obstruction and fistula formation following ingestion of 25 magnets in a 2-year-old girl. Intraoperatively omega shaped intestinal loop with fistula caused by two magnetic balls was found. Intestine trapped with magnetic balls was edematous and inflamed. Resection of intestinal segment was performed, followed by entero-enteric anastomosis. A total of 25 magnets were removed from resected intestine. Conclusion: Single magnet ingestion is treated as non-magnetic foreign body. Multiple magnet ingestion should be closely monitored and surgical approach could be the best option to prevent or to cure its complications.

**Keywords:** Ingestion; Magnetic foreign body; Multiple magnets; Intestinal fistula; Children

### Introduction

Ingested foreign bodies are a common problem throughout the world. More than three quarters of foreign body ingestions occur in children (1). In 90% of cases swallowed foreign bodies pass harmlessly through the gastrointestinal tract. However, around 10–20% of foreign body ingestions require endoscopic removal, and around 1% will require surgical intervention (2). Some of foreign bodies require special considerations, such as batteries and magnets (3, 4). In the last decade the incidence of ingested magnets has grown due to increased use of magnetic toys (4). Single magnet ingestion usually ends spontaneously and do not cause serious complications that require surgical intervention but in case of multiple magnet ingestion or ingestion of magnet with other metal it could cause intestinal obstruction, fistula formation or even perforation (5, 6).

Here we present a case of intestinal obstruction and fistula formation following ingestion of 25 magnets in a 2-year-old girl.

### Case report

A previously healthy 2-year-old girl presented to our surgical emergency department, because of ingestion of several small, spherical magnets earlier that morning. Parents did not see her swallowing those magnets, but they suspected

it, and estimated number of around 20–25 magnets. Physical examination was unremarkable; abdomen was soft and flat, with no signs of peritoneal irritation. Initial abdominal X-ray revealed a metallic foreign body V-shaped necklace formation in middle abdomen (Fig. 1). Based on unchanged clinical status, with no fever, no lethargy or abdominal pain, with all vital signs being normal, the patient was discharged from hospital. The parents got instructions to monitor her stool, and got instructions and description of signs of possible complications. The patient was on repeated follow-ups where unchanged vital signs were found. Repeated abdominal X-ray revealed aboral progression of magnets, but still not reaching the colon (Fig. 2). Nine days following foreign body ingestion, the child was brought back to hospital because she had refused any food. Examination showed that the patient appeared dehydrated with distended, but soft abdomen, with no signs of peritoneal irritation. Following X-ray and laboratory test, along with discussion of potential risks and benefits of surgical treatment, exploratory laparotomy through lower midline incision was performed. Around 100 cm aboral to the ligament of Treitz omega shaped intestinal loop with fistula caused by two magnetic balls was found (Fig. 3). Intestine trapped into magnetic balls was edematous and inflamed. Resection of intestinal segment was performed, followed by entero-enteric anastomosis. A total of 25 magnets were removed from resected intestine (Fig. 4). After the surgery the child was admitted to De-



**Fig. 1:** Initial abdominal X-ray – a metallic foreign body: V-shaped necklace formation in middle abdomen.



**Fig. 2:** Abdominal X-ray on 5th day after ingestion of foreign body – aboral progression of magnets.

partment of pediatric surgery. The patient recovered well postoperatively and she was discharged home on the 5th postoperative day. At regular follow ups no complications were recorded.

### Discussion

Ingestion of foreign bodies is a common pediatric problem, with more than 100 000 cases annually. The most common ingested foreign bodies are coins, toys, batteries, bones or food. Magnets are increasingly ingested (7). Magnets have evolved rapidly in the past three decades. Neodymium magnets were created in 1980s and have much stronger adherence than previously used magnets (8). US

National Electronic Injury Surveillance System described 8.5 times increase of possible ingestion of magnets in underage children in last decade (9). Thus Canadian and USA healthcare institutions have intention to regulate laws to keep strong magnets out of the hands of children (10).

Single magnet ingestion is like swallowing any non-magnetic foreign body, while multiple magnets can cause serious gastrointestinal complications like entero-enteric fistula formation, bowel with associated perforation, peritonitis, and bowel ischemia or necrosis (11, 12).

In our case magnets were beyond ligament of Treitz and proximal to the terminal ileum. Management of asymptomatic patients in that described position is more controversial than in other gastrointestinal part where foreign body could



**Fig. 3:** Intraoperative findings – omega shaped intestinal loop with fistula caused by magnetic balls.

be reached either by esophagogastroduodenoscopy or colonoscopy. Laparotomy and laparoscopy interventions required in case of intermediate position of magnets in gastrointestinal tract increase morbidity and mortality (13). Therefore, conservative therapy should be observed as possible therapeutic option. The consensus of North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition experts suggest conservative approach only in case of direct patient observation (11). Prevention is crucial for this rapidly increasing problem (1). Awareness of possible magnet ingestion as well as potential complications of it, leads to reduced time from ingestion to diagnosis and from diagnosis to final solution.

### Conclusion

It is important to differentiate single from multiple magnet ingestion. Single magnet ingestion is treated as non-magnetic foreign body. Multiple magnet ingestion should be



**Fig. 4:** Resected specimen – intestinal segment with fistula and 25 removed magnets.

closely monitored and surgical approach could be the best option to prevent or to cure its complications.

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