

A rare cause of intestinal perforation: ingestion of magnet

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Background: Ingestion of foreign objects is a common problem in children. Ingestion of one more magnets may require surgical intervention because of risk of perforation.

Methods: A 4-year-old girl was admitted to our department with complaints of abdominal pain and bilious vomiting. She had been treated at another clinic with repeated abdominal X-rays because of ingestion of a magnet 5 days ago. Physical examination revealed diffuse abdominal tenderness and bilious drainage from the nasogastric tube. The magnet was observed by radiopaque imaging in the right epigastric region of the upright abdomen but there was no free air. The magnet was presumed to be in the duodenum and exploratory laparotomy was performed.

Results: During the operation, a perforation was found between the pylorus and duodenum due to the magnet. The foreign body was found to be two magnets adherent to each; the interposed and compressed tissue was necrotized and perforated between the two magnets. The necrotized segment was excised and primary anastomosis was made. The postoperative period of the patient was uneventful and she was discharged on the seventh postoperative day.

Conclusions: Ingestion of foreign objects such as one more magnets may cause intestinal perforation in early stages. If the object stays in the same location shown by repeated X-rays, surgical intervention should not be delayed.

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Introduction

Ingestion of foreign objects is a common problem in the pediatric population. Seventy percent of foreign body ingestions occur in children.^[1] Many of the ingestions are noted in children aged between 6 months and 3 years.^[2] Most of the foreign objects that are passed down to the stomach or to more distal sites are excreted in feces spontaneously without treatment. A particular ingestion of multiple magnetic objects, which, when located in different loops of the bowel, can attract each other and cause pressure necrosis of the bowel wall and subsequent perforation. Fortunately, spontaneous passage of magnetic objects may occur in 80% of cases and about 10%-20% may need endoscopic retrieval, and 1% may cause complications such as obstruction, perforation, or fistula, which require surgical intervention.^[3] Reports showed that ingested magnet caused intestinal fistula formation or perforation, intestinal volvulus, thus leading to intestinal obstruction.^[4,5] In this report, we present a very rare case of a closed loop perforation in the pylorus and duodenum after the ingestion of multiple magnets and review the literatures about the risk of magnet ingestion in children.

Case report

A 4-year-old girl was admitted to our department with complaints of abdominal pain and bilious vomiting. She had been treated at another clinic because of ingestion of one magnet 5 days ago and examined with repeated abdominal X-rays. Physical examination showed remarkably tenderness of her abdomen, and slight muscle guarding on the right upper abdomen. On abdominal X-ray examination, there was no free air or dilated loops of the bowel; however, one opaque foreign body with a round shape was seen in the area of the right upper abdomen. Abdominal X-ray examinations



Fig. 1. Perforation site of the magnets seen between the pylorus and the first part of the duodenum.



Fig. 2. Necrotic tissues seen between the removed magnets.

revealed no changes in the position of the magnet. The magnet was presumed to be in the duodenum; therefore, an exploratory laparotomy was performed. A closed loop perforation from the infero-anterior wall of the pylorus through the duodenum was observed (Fig. 1). The first magnet was in the pylorus and the second one in the first part of the duodenum and the two magnets were adducted to each other interposing the pylorus and the first part of the duodenum. Compressed tissue was found to be necrotized and perforated in between the two cylinder-shaped magnets (Fig. 2). The case history showed that one magnet was ingested but two magnets were found during the operation. The necrotized segments were excised, and primary anastomosis between the pylorus and duodenum was made. The patient was uneventful post-operation and she was discharged on the seventh postoperative day.

Discussion

Foreign object ingestion is a common clinical problem in young children. Commonly ingested objects are coins, toy parts, jewelry, button-type batteries, needles and pins, as well as fish and chicken bones. Ingested foreign bodies usually cause no harm and spontaneously come out through the rectum without any intervention.^[4,6,7] Infants and young children like

to explore their environments by putting objects into their mouths. This is an instinctive behavior of young children. Magnet ingestion is rare, but the ingested magnet is likely to cause severe damage to the gastrointestinal tract regardless of the size and shape.^[4,8]

The ingestion of only one magnet does not cause a problem, but multiple magnets ingested can be harmful. When they become aligned within each other's magnetic field, magnets attract forcefully, dragging the bowel walls by exerting pressure, leading to pressure necrosis with perforation and peritonitis, fistula, or intestinal obstruction or volvulus.^[4] If the ingested magnets are still in the upper gastrointestinal tract in early period, it should be attempted to retrieve them by endoscopy.^[4]

Many of these cases are seen in children younger than 3 years, who presented with intestinal obstruction or acute abdomen although there are cases with few or no symptoms. Symptoms appeared between 1 and 7 days after ingestion.^[9] Early intervention is therefore the key to minimize complications upon suspicion of multiple magnets ingestion, yet it is often difficult to obtain a history of what has been swallowed because 80% of children are less than 5 years old with a median age of 2.8 years.^[1] When a case of magnet ingestion is encountered, one must differentiate between ingestion of a single magnet or multiple magnets by taking a thorough history and obtaining adequate radiographic images. If a pediatrician suspects that more than one magnet has been ingested, this radiologic evaluation would include an anterior radiograph of the chest, abdomen and pelvis; and a lateral radiograph of the neck and abdomen. If more than one metallic foreign body is suspected to be a magnet, the patient should be immediately referred to the pediatric surgery department, and pediatric surgeon should be alerted to potential danger of the situation, which includes a high risk of gastrointestinal tract perforation.^[1,9,10]

Ingestion of a single magnet can be managed in a similar way as in ingestion of other foreign bodies, with a trial of conservative management, expecting uneventful passage through the gastrointestinal tract but when more than one magnet has been ingested, their removal must be performed without delay.^[1]

Toys with magnetic pieces have become popular among the pediatric population, and they are accessible to children because parents are not aware of their potential risks. The alarm has been raised about the risk of bronchial aspiration of small pieces from toys in children younger than 3 years; however, most parents ignore the risk of intestinal perforation because of magnetic attraction of the pieces of these toys. Manufacturers should be providing warning labels on the package of these toys informing about the risk of intestinal perforation through ingestion of magnets.

Prevention campaigns from health authorities should start about the hazards of magnetic toys to prevent the appearance of new cases.^[2]

Ingestion of one more magnets in children may cause intestinal perforation in the early period; these cases should be taken into consideration with careful follow-up. If magnets stay in the same location shown by repeated X-rays, surgical intervention should not be delayed. Clinicians who care for children should be aware of the risks associated with multiple magnet ingestion that has one opaque image in X-ray.

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