Ingestion of Magnetic Foreign Bodies: Two Clinical Cases, Two Approaches

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Abstract

Although rare, the ingestion of magnetic foreign bodies has been increasing due to greater accessibility to toys with embedded magnets. We present two cases of pediatric ingestion of foreign bodies. Case 1 refers to a 16-month-old child with an intestinal obstruction. After an initial assessment and abdominal X-ray that revealed the presence of foreign bodies, the patient underwent surgery. A jejuno-jejunal fistula was identified containing magnets. Case 2 is about a 6-year-old child who swallowed two magnetic foreign bodies, as observed by her mother. The reassuring clinical state of the patient allowed us to maintain conservative treatment. On the eighth day, the foreign bodies were eliminated without complications. Despite the controversy regarding the best treatment after the ingestion of magnetic foreign bodies, the follow-up should be careful and according to the clinical situation, as complications can occur, and urgent surgery may be required.

Keywords: Child; Foreign Bodies/complications; Foreign Bodies/diagnostic imaging; Foreign Bodies/therapy; Gastrointestinal Diseases/therapy; Infant; Magnets

Introduction

Although rare, the ingestion of magnetic foreign bodies has been increasing due to greater accessibility to toys with small embedded magnets. Magnet ingestion implies careful consideration since serious complications can occur and urgent surgery can be required.[1]

We present two case reports of ingestion of magnetic foreign bodies. The therapy was established according to the clinical status and radiological findings and it was different in each case.

Case Report

Case Report 1

A 16-month-old male patient was referred to our hospital with a 24-hour history of irritability, abdominal pain, nausea, bilious vomiting, and constipation. Upon admission to our emergency department, a physical examination revealed severe dehydration, a mildly distended abdomen with absent bowel sounds (in the district general hospital, they were described as high-pitched bowel sounds), and right quadrants' tenderness. The patient was stabilized with fluid resuscitation and gastric drainage, which showed fecal content. The abdominal radiography showed a foreign body in the bowel, with small bowel dilatation and no gas in the rectum; no free air was present (Fig. 1). The nature of the object was unknown. Five hours later, another abdominal radiography was performed with similar results.

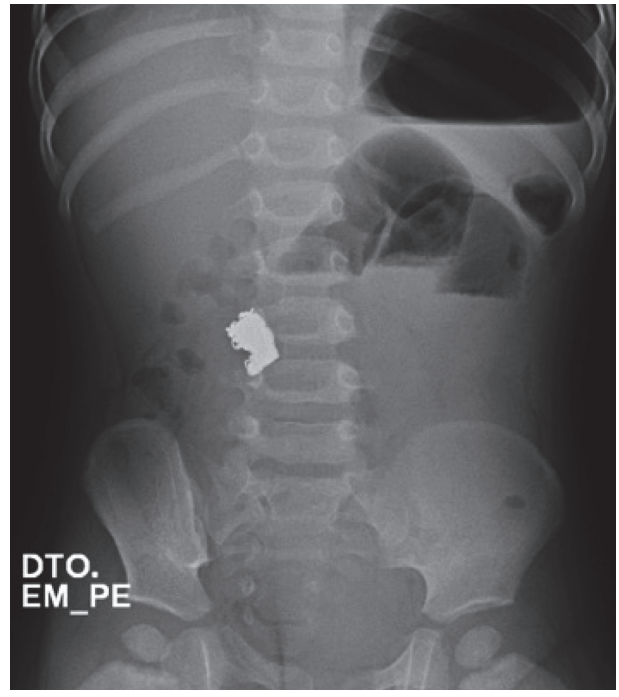

Figure 1. Case 1. Abdominal radiograph at admission. Foreign body in the bowel, with small bowel dilatation and no gas in the rectum; no free air was present.

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Due to clinical worsening, with increased vomiting, abdominal distension, and maintenance of the foreign bodies in the same position, surgery was performed. During laparotomy, a jejuno-jejunal fistula containing foreign bodies (two metallic and three magnetic objects) was identified, with a proximal top at 35 cm from the duodenojejunal angle and the distal top at 105 cm (Fig. 2). The intestinal obstruction occurred due to an internal hernia with the trapping of the small bowel. The procedure involved fistula division, removal of foreign bodies and enterorrhaphy. An intraoperative abdominal radiography was done to exclude other foreign bodies. The patient was discharged on the fifth postoperative day and remains asymptomatic at two years of follow-up.

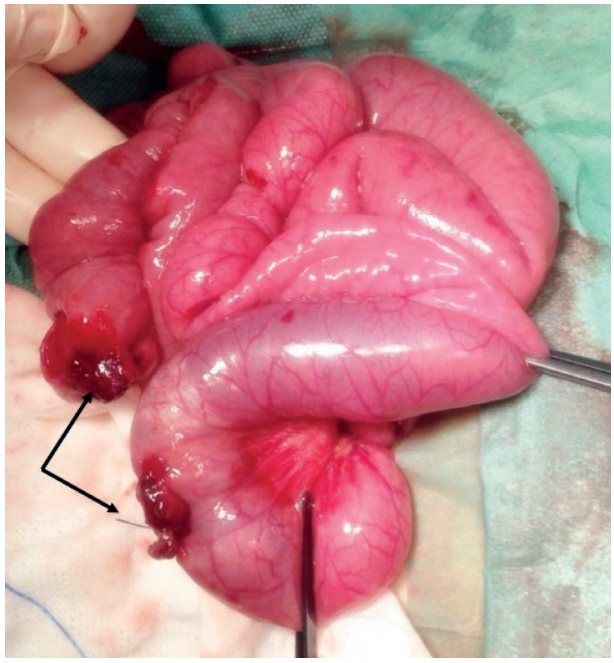

Figure 2. Case 1. Intraoperative image showing the jejuno-jejunal fistula top (arrows) after the division of the fistula.

Case Report 2

A 6-year-old female patient was referred to our hospital seven days after ingesting two magnetic foreign bodies containing neodymium. She was previously maintained under conservative treatment (lactulose and serial abdominal radiographs) at the district general hospital and remained asymptomatic. At that time, pediatric surgery was consulted because the foreign body remained unchanged for two consecutive days. In our hospital, an abdominal radiography was performed (Fig. 3) and showed the foreign bodies together in the lower left abdominal quadrant. As there was no evidence of complications, conservative treatment was maintained, and cleaning enemas were initiated. In the next day, she passed the foreign bodies without any intercurrence.

Figure 3. Case 2. Abdominal radiograph on the seventh day after foreign body ingestion. Radiopaque image, compatible with two magnets attached.

Discussion

In children, 98% of foreign body ingestions are accidental and involve common household objects. Clinical presentation is variable, and sometimes the ingestion is reported by the caregiver and the patients are asymptomatic. The type and location of objects, the child's age, symptoms and time since ingestion should all be considered in the management decision.[1]

In recent years, the risk associated with the ingestion of a magnetic foreign body has been exacerbated by the availability of magnets containing neodymium, which gives them greater attractive force and increases the risk of gastrointestinal injuries and even death.[1,2] In 2011, a systematic review reported 98 cases of foreign bodies ingestion, mostly in children under 5 years old.[3] Between 2002 and 2012, 56 cases of ingestion of magnetic foreign bodies were registered in one institution, 98% of them after 2006. In 56% of those cases, the children had ingested multiple foreign bodies and most of them required surgical intervention.[2]

In 2015, the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition (NASPGHAN) published an algorithm for foreign body ingestion management, which included magnetic objects. According to this publication, if the child has ingested only one magnetic foreign body, it is generally safe not to remove it, unless radiologic images cannot clearly determine

whether a single magnet is truly present. To avoid errors, at least two radiographic views (anteroposterior and lateral) of the abdomen are necessary to discriminate the number of foreign bodies present.[1]

In the case of multiple magnetic foreign bodies ingestion, the child should be immediately observed, and radiography performed.[1,4] In these cases, even in asymptomatic patients, urgent removal is indicated when the site is amenable to endoscopic retrieval.

In asymptomatic patients with multiple magnetic foreign bodies beyond duodenojejunal junction and the terminal ileum, the treatment is controversial. If small bowel enteroscopy is unavailable, conservative management may be a reasonable alternative to reduce the risks of morbidity, mortality, and costs associated with surgery. When the conservative management is chosen, the patient should be maintained in the hospital setting and serial radiographs (at least every 4-6 hours) should be performed until foreign bodies elimination is confirmed, as was done in case 2.[1]

Surgery should be considered in cases with clinical worsening or the non-progression of foreign bodies through the bowel.[1] Observation of gaps between magnets or between magnets and metal foreign bodies should raise the possibility of entrapment and ischemic damage to interposed bowel walls.[2,5] However, the absence of these gaps does not allow the exclusion of fistulae, especially when the type and number of foreign bodies ingested is not known, as in case 1. Ingestion of a single magnetic foreign body along with other metallic objects has the same risk as the ingestion of multiple magnetic foreign bodies.[1,5]

The detailed history of ingestion is of great importance to decide the treatment. Patients can remain asymptomatic until complications occur, which may cause a delay in the diagnosis. Sometimes the parents do not know the nature and number of ingested foreign bodies and initial conservative treatment may be established despite some risk of complications, although metallic/radiopaque images should raise high concern.

In case 1, the foreign body composition was unknown; however, the patient clinical worsening and the unaltered position of the foreign body in radiography led us to consider surgical treatment.

Several reports describe complications from the ingestion of magnetic foreign bodies, most of them occurring by the magnetic effect of foreign bodies located in different segments of the bowel, causing necrosis and fistula. Other complications include ulceration, gastric obstruction, bowel obstruction, esophageal perforation, gastroenteric fistula, small bowel volvulus, and appendicitis.[6-8]

In conclusion, the current report presents two cases of magnetic foreign bodies ingestion with different management options, ranging from observation to a surgical intervention. In case 2, the fusion of the two magnets and their progression on serial radiographs without complications allowed a conservative attitude.

There is still some controversy about the best treatment to be instituted, conservative treatment *versus* surgical intervention, but in our opinion, this should be addressed on a case-by-case basis. The emergency physician can often be the first physician to evaluate this entity and, therefore, should recognize the clinical indications for early surgical consultation and referral. An early and accurate diagnosis of multiple foreign body magnets is important to ensure the proper management of the condition because, as we have seen, there is a high potential for gastrointestinal injury.

WHAT THIS CASE REPORT ADDS

- Ingestion of magnetic foreign bodies by children may be associated with gastrointestinal lesions requiring surgery and even death.
- The detailed history of ingestion, including the number and type of the objects, is of great importance to guide management.
- In cases of ingestion of magnetic foreign bodies, the approach should be addressed on a case-by-case basis.

Conflicts of Interest

The authors declare that there were no conflicts of interest in conducting this work.

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Consent for publication

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Confidentiality of data

The authors declare that they have followed the protocols of their work centre on the publication of patient data.

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Ingestão de Corpos Estranhos Magnéticos: Dois Casos Clínicos, Duas Abordagens

Resumo:
Embora rara, a ingestão de corpos estranhos magnéticos tem aumentado devido à maior acessibilidade a brinquedos com ímanes incorporados. Apresentamos dois casos clínicos de ingestão de corpos estranhos magnéticos em idade pediátrica. O caso 1 refere-se a um lactente de 16 meses com um quadro de oclusão intestinal. Após avaliação inicial e realização de radiografia simples do abdómen, que revelou a presença de corpos estranhos, foi submetido a intervenção cirúrgica. Identificou-se fístula jejuno-jejunal contendo corpos estranhos magnéticos. O caso 2 refere-se a uma criança de seis anos que engoliu dois corpos estranhos magnéticos observada pela mãe. Por estado clínico tranquilizador manteve-se sob tratamento conservador tendo eliminado os corpos estranhos ao oitavo dia, sem intercorrências. Apesar da controvérsia existente sobre o melhor tratamento após ingestão de corpos estranhos magnéticos, a orientação deve ser cuidadosa e de acordo com a situação clínica, face às possíveis complicações e eventual necessidade de intervenção cirúrgica urgente.

Palavras-chave: Corpos Estranhos/complicações; Corpos Estranhos/diagnóstico por imagem; Corpos Estranhos/tratamento; Criança; Gastroenteropatias/tratamento; Imanes; Lactente