

Magnets Playing Hide and Seek: A Case Report of Hidden Magnets in a Child

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Abstract

With the now widespread use of small magnets in household items and toys, ingestion of these items has become a serious health hazard which carries the possibility of complications such as gastrointestinal (GI) tract perforation, hemorrhage, necrosis and death. While endoscopic retrieval of these objects has long been in practice, the possibility of the magnets attaching to the scope without practitioner's knowledge has not received sufficient attention in literature. Here we report a case of a 5-year-old female who was admitted for endoscopic retrieval of two small magnet ball bearings that she had swallowed shortly before admission. The search for the foreign objects was made difficult by ingested food obstructing the view. Fluoroscopy was also unremarkable. The procedure was ultimately deemed unsuccessful and terminated after 56 min. Both ball bearings were found attached to the scope upon inspection of the scope post procedure. Attachment of magnets to the scope should be a consideration during endoscopic removal, especially in cases of poor visibility. This can potentially help reduce unnecessary prolongation of procedures and therefore, complications including postoperative anesthesia symptoms, perforation, etc.

Keywords: Foreign body ingestion; Magnets ingestion; Multiple magnets; Endoscopic removal; Foreign body ingestion

Introduction

Magnets have become a large health concern in recent years in children as technology has led towards smaller size yet more powerful (5 - 30 times) neodymium containing innovations [1, 2]. Gastrointestinal (GI) ingestion of foreign bodies (FBs)

mostly occurs in children between the age of 6 months and 6 years [3]. The age distribution for magnetic FBs is noticed to be higher compared to other FBs. A median age of 4.7 years was observed in a large cross-sectional study conducted in the United States from 2002 to 2010, which reported > 22,000 cases of multiple magnets ingestions in children [4]. The median age of patients was 3.9 (interquartile range (IQR): 2 - 7) years in a more recent multicenter retrospective analysis across multiple countries. The age distribution was: > 50% in the age group 0 - 4 years, 34.9% in the age group > 4 to 9 years, and 7.4% in the age group > 9 to ≤ 18 years [5].

Ingestion of a traditional magnet leading to bowel perforation has been reported as early as 1995, in Japan [6]. Initially brought to attention as case reports, the numbers have steadily increased since early 2000s [1]. Magnetic probes have long been used to endoscopically retrieve ingested magnetic and metallic FBs. While the protocol for retrieval has been established, inadequate light has been shed on the possibility of magnets attaching to the scope itself during the procedures, making them difficult to find. We are presenting a case of magnets ingestion in a child, where no magnets were seen on endoscopy and fluoroscopy as they got attached to the scope.

Case Report

A 5-year-old child with no known medical problems, was brought to the emergency room by her grandfather, who reported that the child accidentally swallowed magnetic ball bearings 2 h prior to the presentation. There were no pertinent findings on the patient's medical and surgical history. The patient had secondhand exposure to smoking at home, as the father smoked cigarettes and used vapes inside the house. At the time of presentation, the child was asymptomatic and hemodynamically stable. Blood pressure was 112/75 mm Hg, heart rate 99 beats/min, and temperature 98.7 °F. On examination, there were no signs of distress. Abdomen was soft, and without distension or tenderness. Lungs sounded clear and heart sounds were normal on auscultation. On neurologic exam, she was appropriately alert oriented for her age and no focal neurologic deficits were noticed. An abdominal X-ray showed two small (4 mm) metallic foci within the stomach (Fig. 1). An upper endoscopy was performed for the retrieval of the FBs. No foreign objects were found as far as the third portion of the duodenum on upper endoscopy (Fig. 2a, b). Assessment was limited as the ingested food obstructed the view. Fluoroscopy was done with no FBs noted. The scope was finally retracted,

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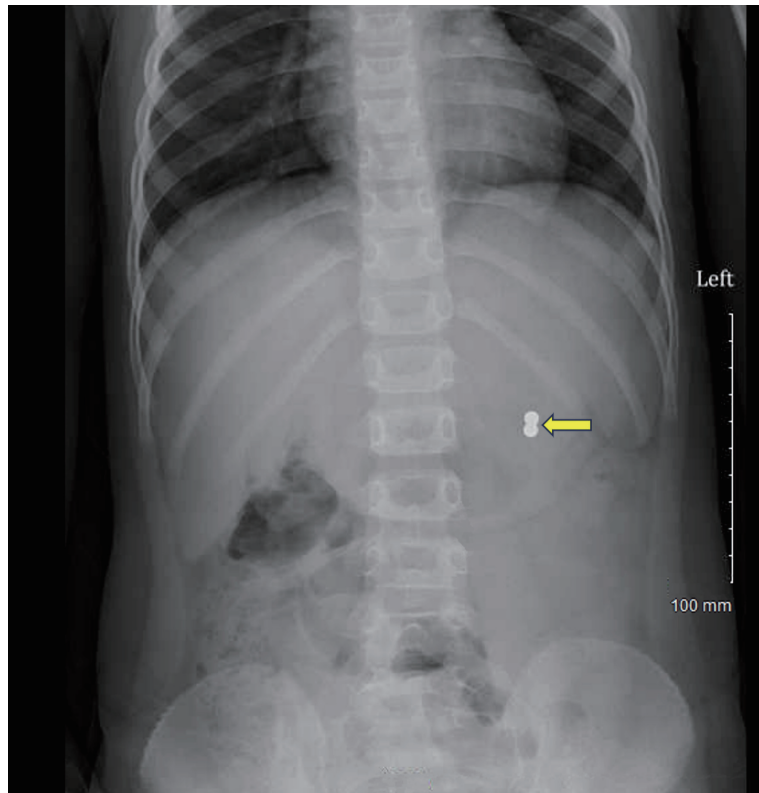


Figure 1. A radiograph showing two 4-mm ball bearing magnets within the stomach (yellow arrow).

and the ball bearings were found attached to the back of the scope (Fig. 3). The procedure took a total of 56 min, almost 1.5 to 2 times the expected duration. The patient was in stable condition with no complaints after the procedure and was discharged home shortly thereafter.

Discussion

Coins, buttons, batteries, magnets, small toys, pieces of jew-

elry, plastic sheets and fruit stones are the commonly ingested FBs [1], and 2% of swallowed FBs are magnets [5]. Ingestion of FBs is associated with significant morbidity and mortality, depending on the size, shape, and patient's physical condition; therefore, endoscopic removal is recommended [1]. Size is an important factor as 9.6% (n = 57) life-threatening morbidities were reported in 574 children with magnet ingestion of less than 5 cm [6]. Complications are more likely with the ingestion of multiple magnets. The concern with magnets lies in their electromagnetic force that allows them to attach to one

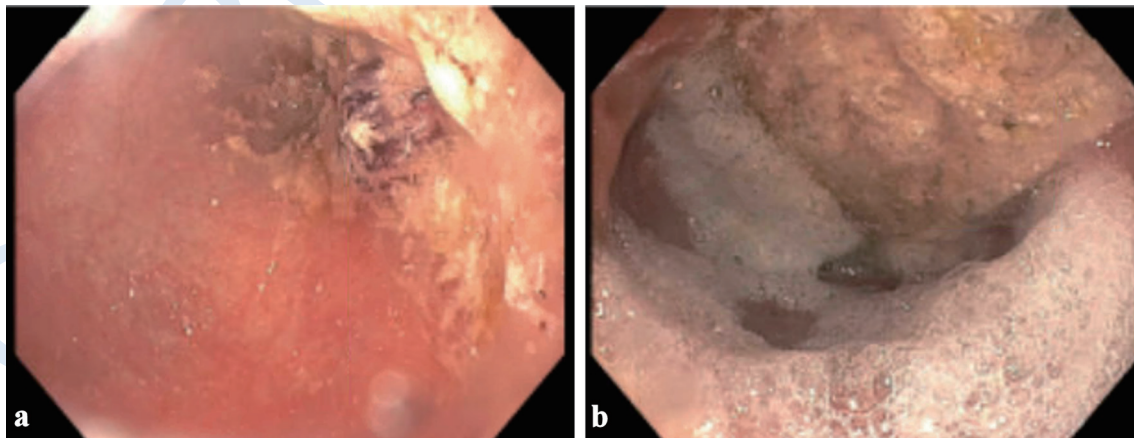


Figure 2. Images showing pre-pyloric region (a) of the stomach and antrum of the stomach (b) during endoscopic evaluation without evidence of mucosal injury or the foreign bodies.

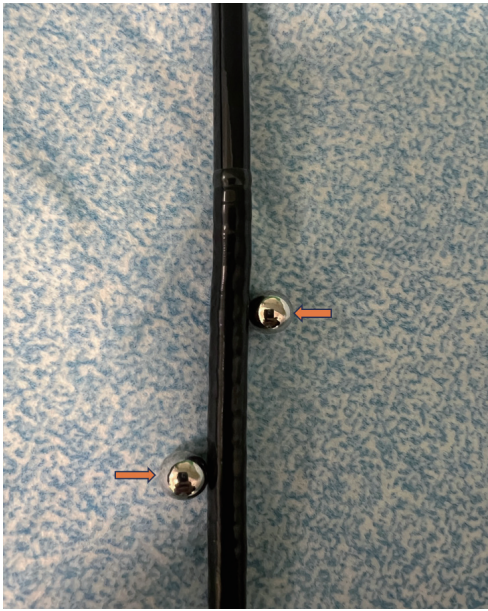


Figure 3. Two small spherical magnets can be seen attached to the gastroscope (orange arrows).

another within GI tract, across the GI and peritoneal layers, leading to obstruction, pressure necrosis, perforation, and infection [7]. There is no consensus on the use of laxatives although many clinicians use it to accelerate the passage of magnets through the intestine, and it may also help prepare for endoscopy if ultimately required [8].

Plain radiography is usually the initial investigative study, and multiple views are recommended to determine if a single versus multiple magnets are ingested, as the magnets might stick to each other and look as one or overlap on a single view [8]. Same caution is recommended for fluoroscopy, and two views (antero-posterior and lateral views) are preferred for better visualization [9]. If two magnets appear lying next to each other on fluoroscopy, it is also possible that they are present in separate bowel segments and penetrating the bowel walls [7]. The European Society of Gastrointestinal Endoscopy (ESGE) has characterized the retrieval of FBs based on the timing of intervention into emergent, urgent, and non-urgent, taking into account the nature of FBs and their location. Magnets require urgent removal (within 24 h of ingestion) to prevent complication from prolonged retention [10]. Endoscopy is minimally invasive compared to surgery and balloon enteroscopy (single or double) can be attempted in selective cases [1]. A success rate of 66-89% successful retrieval on endoscopy (upper and lower) has been reported [11, 12]. It is also important to note that unsuccessful upper endoscopic retrieval is more likely to occur with magnets swallowed > 12 h prior. Surgery is recommended in case of inconclusive endoscopy [13], inaccessible location of magnet, non-progression on serial radiography, and symptomatic patients with adverse events [9].

It is important to know that the barriers in finding ingested magnets (or FBs in general) include their attachment to the scope. This will help avoid complications related to the pro-

longation of endoscopic procedure, and anesthesia time can also be reduced [5]. In the case of unsuccessful endoscopic procedures, surgery is deemed the next step in management. Surgery is a much more invasive procedure compared to an upper endoscopy with an additional risk for potential complications.

Conclusions

It is important to consider the possibility of attachment of magnetic objects to the scope during endoscopic retrieval. This can help minimize unnecessary prolongation of the procedure and therefore reduce the risk of complications.

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Financial Disclosure

None to declare.

Conflict of Interest

None to declare.

Informed Consent

The informed consent was obtained.

Author Contributions

Yasir Ahmed MD, as the primary author, contributed to the images making, case description, literature review, and referencing. Pooneh Farhangi MD: initial drafting of introduction, case description and discussion. Ibrar Atiq MD, contributed to discussion, review, and editing. Fahad Malik MD: description of images, final review and editing prior to publication. Gregory Scagnelli MD: conception of the article, final review and editing prior to publication.

Data Availability

The authors declare that data supporting the findings of this study are available within the article.

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