Early recognition is important when multiple magnets masquerade as a single chain after foreign body ingestion

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Abstract
Ingestions of multiple magnets can lead to serious damage to the gastrointestinal tract. Moreover, these foreign bodies can take deceptive shapes such as single chains which may mislead clinicians. We report the case of a ten-year-old boy who swallowed 33 magnets, the most yet reported, which took on the appearance of a single loop in the stomach, while actually being located in the stomach, small bowel, and colon. Early recognition and prompt intervention are necessary to avoid complications of this foreign body misadventure.

In the last 10 years the incidence of magnetic foreign body ingestion has continued to rise with the increased popularity of magnetic toy sets [1]. There have been numerous case reports of multiple magnet ingestions in children causing severe small bowel injury [2,3]. The majority of patients with multiple magnet ingestion will require some form of surgical intervention. The following case is of a young male with developmental delay who swallowed 33 spherical magnets, the highest number reported to date. On presentation, the objects were not immediately recognized as magnets, as they were mistaken for a single foreign body located in the stomach. After investigation, it was found that the magnets were actually located throughout multiple segments of the gastrointestinal tract. Using a combination of endoscopy and surgery, all of the magnets were recovered without significant intestinal damage. Early recognition of multiple magnet ingestion by physicians is crucial to the timely treatment of pediatric patients.

1. Case report

A previously healthy 10-year-old male with autism was brought to GI clinic by his mother, who reported that the patient had an un-witnessed foreign body ingestion several days before presentation.

The patient complained of generalized abdominal pain but did not show any signs of obstruction or perforation. An abdominal radiograph was taken and demonstrated what appeared to be a bracelet composed of 33 beads located in the stomach (Fig. 1). The patient was admitted by the pediatric GI service for observation, and esophagogastroduodenoscopy was scheduled for the next day. The following morning an abdominal X-ray did not show progression of the foreign body into the small intestine, so the patient underwent endoscopy. Only eight of the beads were visualized in the stomach, and it was discovered that the bracelet was actually composed of individual spherical magnets. The eight beads appeared to be embedded in the gastric mucosa and could not be removed via endoscopy. At this point, general surgery was notified, and it was determined that the beads were magnets whose force held them together strongly.

Utilizing a laparoscopic approach, a string of magnets located in the jejunum were separated from the magnets located in the stomach. Once separated, the eight magnets were able to be removed from the stomach via endoscopy. An enterotomy was made in the jejunum and eleven magnets were removed. There was a second area of adherence noted from the jejunum to the transverse colon causing a full thickness erosion. Due to the significant number of magnets remaining, a laparotomy was performed. After 31 of the beads had been removed, fluoroscopy was brought in to find the two remaining magnets. These were found to be in the duodenum and were removed endoscopically. In total eight magnets were removed from the stomach: two from the duodenum, 16...
from loops of the jejenum and ileum, and seven from the transverse colon. Three areas of full thickness erosions were noted as well as two areas of partial erosion, but no segments of bowel required resection. The patient was extubated post-procedure and was tolerating a full diet by post-op day six. He was discharged post-op day seven without complication.

2. Discussion

Over 100,000 cases of pediatric foreign body ingestions are reported each year [4]. While the CDC issued a warning for children’s toys containing magnets in 2006 [5], the number of magnet ingestions continues to rise [6]. Many foreign body ingestions, if small enough, can be managed purely with careful follow-up. Watchful waiting would also be the appropriate management for a single magnet ingestion. However, multiple magnet ingestion carries with it a high risk of morbidity and mortality. Caregivers as well as physicians should have a high index of suspicion when dealing with young children or older children with developmental delay who have foreign body ingestions. Most of the magnets ingested by children take the shape of small round beads, so physicians should be on high alert when foreign bodies of this nature appear on abdominal X-rays. In this case, the deceptive nature of the X-ray delayed surgery for a day, as the magnets were thought to be a single piece of jewelry. As exemplified in this case, it is possible for ingested magnets to form familiar shapes, such as rings, and to masquerade as other foreign bodies. Although the radiograph appeared to show a ring located entirely in the stomach, it was actually formed through various loops of bowel. Therefore, it is up to physicians to have a low threshold to investigate all foreign body ingestions carefully.

As more reports are presented detailing the severe complications associated with multiple magnet ingestions, there has been a push for earlier and more aggressive treatment. Some suggest that all magnet ingestions should be treated as a multiple ingestion until proven otherwise [7]. In 2009 Shah et al. proposed that all multiple magnet ingestions shown on radiograph to be post-pyloric be taken directly for laparotomy [8]. More recently, Waters et al. included endoscopy for pre-pyloric as well as laparoscopy and laparotomy for post-pyloric in their algorithm for confirmed multiple magnet ingestions [9]. Laparoscopy has already demonstrated itself as a valuable tool in the management of pediatric foreign body ingestions [10]. The short procedure lengths and hospital courses associated with laparoscopic surgery make it reasonable alternative to delaying surgery until the patient shows signs of peritoneal irritation. Early surgical intervention in patients with confirmed multiple magnet ingestions could decrease the risk of bowel injury and decrease hospital stay [11]. If serial abdominal radiographs do now show any progression of the foreign body, it is likely the magnets have adhered to each other intestinal mucosa and surgeons should be notified. The more time that passes, the greater chance there is of the magnet’s causing an entero-enteric fistula, obstruction or perforation.

In the case presented, it is fortunate that this patient did not experience severe complications from the intestinal erosions caused by the magnets. This case describes the largest known number of pediatric magnet ingestions to date (33) and serves as an excellent reminder of the deceptive nature of magnetic patterns. Turning quickly to surgery should be considered in the management of all magnet ingestions in children. It is important to recognize common patterns of ingested magnets and their ability to form familiar shapes through multiple loops of bowel on abdominal radiographs. Increased awareness of these dangers by parents, physicians and surgeons can help reduce the number of intestinal complications caused by ingesting these toys.

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Conflict of interest

The authors have no conflicts of interest.

References