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Role of Nose to Pelvis Imaging in the Evaluation of Foreign Body Ingestion: A Case of Magnet Ingestion in a 2-Year-Old

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Abstract: Foreign body ingestion (FBI) of small-rare-earth-magnets (SREM) sets are associated with high morbidity and mortality, as these tend to cause significant mucosal injury. Current clinical guidelines for the evaluation of FBI do not include imaging of the nose and neck. A 2-year-old patient presented with known SREM ingestion, with location confirmed in the right lower quadrant on imaging at the time of initial evaluation. Subsequent imaging involving the neck revealed additional magnets lodged in the patient's hypopharynx, which were missed on initial evaluation. This case highlights the importance of considering advanced imaging of the nose and neck to uncover extraintestinal foreign bodies.

Key Words: foreign body ingestion, high powered magnets, imaging, guidelines

INTRODUCTION

Unintentional foreign body ingestion (FBI) in pediatric patients is not an uncommon occurrence, as pediatric FBI affects up to 75% of children younger than 6 years of age worldwide (1). Unfortunately, the number of cases of small-rare-earth-magnets (SREM) ingestions in the United States is increasing, especially since 2016 after SREMs were once again allowed to be sold in the United States (2). To date, clinical guidelines for the initial management of magnetic (and button battery) FBI with imaging has primarily focused on anteroposterior (AP) and lateral radiographs of the chest and abdomen (3,4). These images have facilitated confirmation of the number of objects ingested, the type of object ingested, the location of the objects in the gastrointestinal (GI) tract and have served to assist clinicians in developing management plans. However, current guidelines do not include surveillance of areas outside of the GI tract, more specifically, inspection for internalized nasal foreign bodies (FB) or nasal aspiration of FBs. We report a case of a 2-year-old patient who had SREMs in his hypopharynx that were missed on initial imaging of his chest and abdomen and needed to be removed before his subsequent procedures. This highlights the importance of obtaining full AP and lateral nose to pelvis radiographs on initial FBI evaluation.

CASE REPORT

A previously healthy 2-year-old boy was taken to his local Urgent Care after reportedly ingesting a chain of spherical SREMs earlier that day. Parents were initially told to monitor for passage of the magnets in his stool. They then presented to our Emergency Department (ED) 17 hours postingestion for further evaluation. On presentation, the patient was noted to be asymptomatic with vital signs appropriate for age. Initial evaluation included AP and lateral radiographs of his chest and abdomen. Abdominal films (Fig. 1) revealed a ring of 12 small, radiopaque spherical magnets measuring approximately 17.3 mm in diameter (each ring measuring about 3.3 mm) in the right lower quadrant (RLQ) without signs of free air or perforation. During admission, serial imaging that included the nose revealed three additional magnets in the hypopharynx (Fig. 2) that were not visible on the initial imaging. These images also demonstrated a lack of progression of the magnets located in the RLQ, indicating that endoscopic or surgical intervention would be required. Otolaryngology was consulted and performed direct laryngoscopy, during which several magnets were confirmed to be embedded in the lateral right lingual surface of the epiglottis. These were successfully removed, although erosions were found in the epiglottis. Subsequent colonoscopy found the RLQ magnets to be approximately 5 cm within the terminal ileum, embedded within the wall of the intestine, concerning for perforation with fistulization (Fig. 3). Pediatric surgery was consulted, and exploratory laparotomy with enterotomy allowed for the identification and removal of all 12 magnets. The patient recovered well and was discharged home in stable condition 1 week after hospitalization.

DISCUSSION

Our case continues to demonstrate the importance of clinician vigilance in the management of magnet ingestions in children. SREMs are currently marketed in office products and toys, making them much more accessible to children. They are associated with significant morbidity and mortality due to the potential of these high-powered magnets to cause enteroenteric fistulas, perforation, ischemia, necrosis, and death. Prompt evaluation, preferably at a pediatric center, is not disputed. The most recent clinical guidelines for the management of magnetic ingestion from the North American Society of Pediatric Gastroenterology, Hepatology, and Nutrition (NASPGHAN) hinges upon the accurate assessment of whether the ingestion involved a single magnet or multiple through radiographic imaging (3). No existing clinical guidelines suggest evaluation of the head and neck in these instances. It is important for pediatric gastroenterology teams to have awareness of the risks of concomitant internalization of dangerous FBs outside of

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Dr Johnson did writing and editing subsequent drafts, revising the work critically, and finalizing all content. Dr Ullah is responsible for substantial contributions to the conception of the work. Dr Abell is responsible for final approval of the version to be published.
Informed consent was obtained from the parents for publication of the case details.

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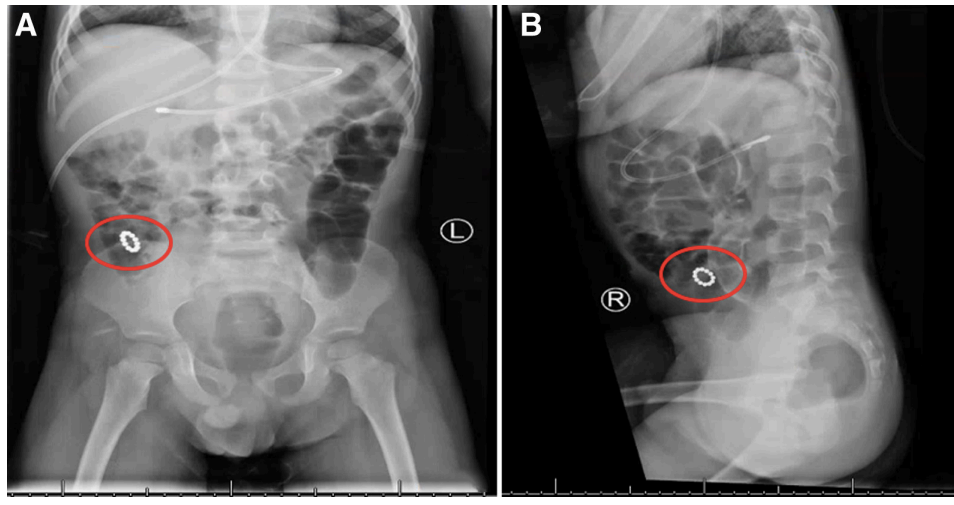

FIGURE 1. A) Supine AP abdominal radiographic imaging revealing the 17.4 mm diameter ring of 12 magnetic beads in the RLQ (each ring measuring about 3.3 mm); B) Lateral view of the abdomen, confirming the location in the RLQs. RLQ = right lower quadrant.

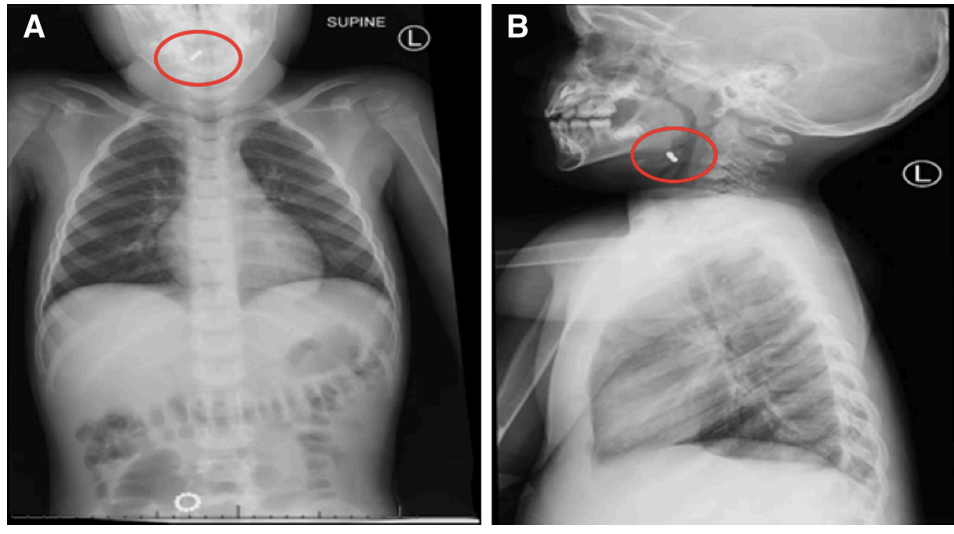

FIGURE 2. A) AP radiograph from the nose to the abdomen, revealing the same ring of 12 magnetic beads in the RLQ, as well as three beads in the upper aerodigestive tract; B) Lateral view of the neck and chest, confirming the location of at least three beads in the hypopharynx. RLQ = right lower quadrant.

the GI tract, particularly involving the airways, as this may have implications on maintaining secure airways during endoscopic or surgical procedures. Sharp objects have a higher likelihood of becoming lodged in the posterior hypopharynx compared with blunt objects that tend to pass into and through the GI tract spontaneously. Otolaryngology literature related to the role of imaging in the assessment of known impacted FBs in the upper airway has involved AP and lateral neck radiographs in addition to AP and lateral chest radiographs. Approximately 80% of cases of obstruction due to FBI occur in the hypopharynx or cervical esophagus (5). Typically, with hypopharyngeal FBs, patients describe a globus sensation or odynophagia. However, our young pediatric population most affected by unintentional FBIs may not yet have the necessary language skills to effectively express the symptoms associated with FBIs. Therefore, the use of advanced imaging that also includes evaluation of the aerodigestive tract may improve detection of these FBs.

In sum, no FBI clinical guidelines exist that encourage providers to obtain AP and lateral nose to pelvis radiographs to evaluate for unintentional ingested or internalized FBs. Standardization would be particularly important to minimize the variation that exists between the initial evaluation of FBIs from one institution to the next. This is one of the first reported cases of FBI of SREMs involving the hypopharynx. Extending imaging to include the nose and aerodigestive tract is essential to ensure secure airways before procedures and decrease the morbidity and mortality

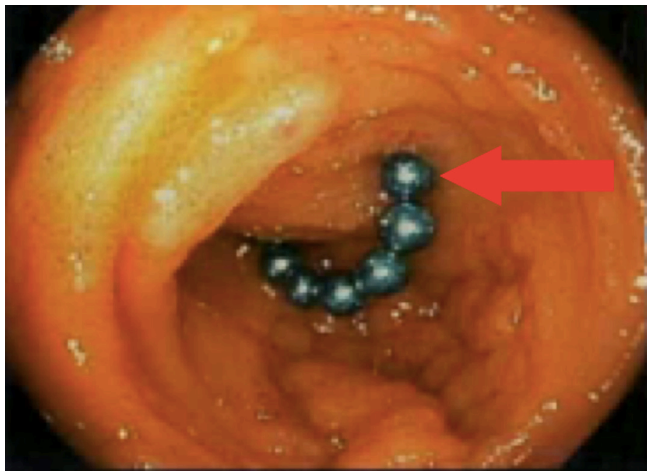

FIGURE 3. Endoscopic view of the ring of magnets in the terminal ileum.

associated with FBI, especially magnets, in an already vulnerable patient population.

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