

## IMAGE DIAGNOSIS

# Neodymium Magnetic Bead Ingestion in a Toddler

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Perm J 2020;24:19.165

E-pub: 04/16/2020

<https://doi.org/10.7812/TPP/19.165>

## CASE PRESENTATION

An 18-month-old girl presented to the Emergency Department with 36 hours of nonbloody, nonbilious emesis. She last had a bowel movement 2 days earlier, and it was normal. She had been intermittently placing her hands on her abdomen as if in pain. She had no fevers. The parents said that until this time she had been generally well without sick contacts or prior similar episodes.

The physical examination findings demonstrated an alert and nontoxic appearing child with a distended abdomen and diffuse mild tenderness to abdominal palpation. The remaining physical examination findings were unremarkable. The results of her bloodwork and urine analysis testing were unrevealing. An abdominal radiograph (Figure 1, A) revealed 4 4.3mm adjacent radiopaque foreign bodies (FBs) in the midabdomen with associated early or partial small-bowel obstruction. Retrospectively, her parents reported no awareness of an FB ingestion.

The patient underwent an uncomplicated laparotomy with lysis of adhesions and bowel repair at 3 sites of presumed perforation, as well as removal of the 4 contiguous FBs (Figure 1, B).

The child had an uncomplicated recovery. The removed FBs were determined to be neodymium magnetic beads.

## DISCUSSION

Consumer access to high-powered neodymium magnets led to a newly described risk of bowel perforation and obstruction if ingested.<sup>1-7</sup> This risk was not previously observed in typically accessible and lower-powered magnets. The observed injury rate from high-powered magnets rose dramatically in 2009 with the marketing of a large collection of small neodymium magnetic beads commonly known as Buckyballs.<sup>8,9</sup> This rising injury rate, including death, led to a temporary ban on the products, which was overturned in 2018<sup>10-12</sup>; they are currently on the market.

In cases of magnetic FB ingestion, patients with single or asymptomatic ingestion of multiple magnetic beads may undergo observation with or without laxatives, or the FBs may be retrieved surgically or endoscopically.<sup>13,14</sup> Symptomatic magnet ingestion (ie, with abdominal pain or vomiting) is managed with magnet removal because of the risk of perforation.<sup>5,13,14</sup>

High-powered magnets such as the ones in this case carry a higher rate of complications than do other ingested FBs. A magnet separated from another magnet or another magnetic metallic object can join across tissue barriers, leading to bowel perforation.<sup>1-5,13,14</sup> The “spot-welding” perforation of a slow tissue necrosis induced by the steady pull of magnetic forces allows adhesions to form concomitantly and frequently walls off the perforation and prevents general peritonitis.<sup>4,7,8</sup> Presumably, this is the explanation for the often occult and insidious clinical presentations of these patients.<sup>2,5,6,14-16</sup> The difficulty of diagnosis is further confounded by the age range most common for FB ingestions, 6 months to 3 years. A patient in this age range

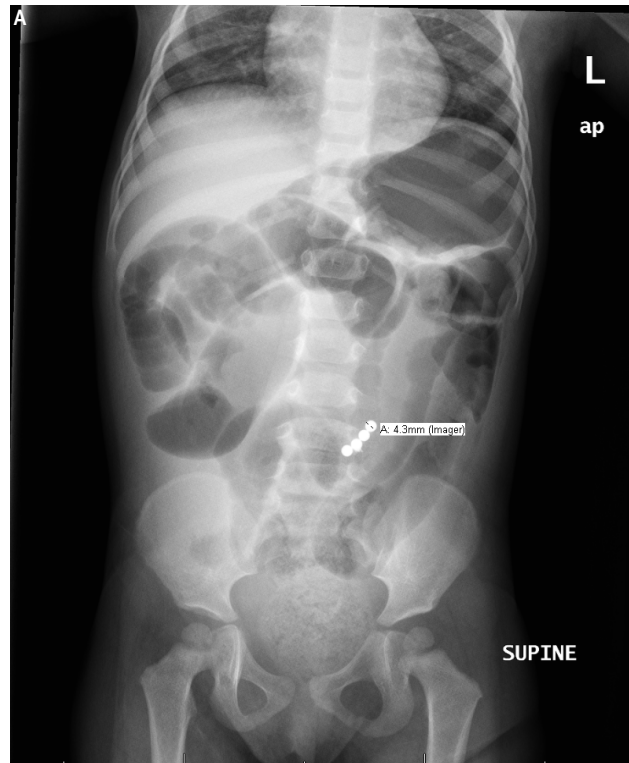


Figure 1. A. Abdominal radiograph reveals 4 small adjacent radiopaque foreign bodies in the midabdomen.

may have an unknown ingestion and be unable to describe or localize his/her pain.<sup>4,17</sup>

Clinicians who care for young pediatric patients in all settings should keep a high index of suspicion for occult FB ingestion as a potential explanation for signs or symptoms involving the abdomen, such as vomiting or abdominal pain. If the practitioner suspects an FB ingestion or initiates a diagnostic evaluation

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Keywords: foreign body ingestion, magnet ingestion, pediatric, vomiting



Figure 1. B. Surgically removed contiguous magnetic foreign bodies clinging to a surgical clamp.

because of an emergent condition such as bowel obstruction, consideration should be given to plain films that may readily identify a radiopaque FB as the explanatory cause and obviate the need for greater ionizing-radiation studies.<sup>18</sup>❖

**Disclosure Statement**

*The author(s) have no conflicts of interest to disclose.*

**Acknowledgments**

*Kathleen Loudon, ELS, of Loudon Health Communications performed a primary copy edit.*

**How to Cite this Article**

Hui KJ, Arasu VA, Vinson DR, Cotton DM. Image Diagnosis: Neodymium Magnetic Bead Ingestion in a Toddler. Perm J 2020;24:19.165. DOI: <https://doi.org/10.7812/TPP/19.165>

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