An unusual cause of vomiting in a 13-month-old

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The case

A 13-month-old partially immunized girl with no significant medical history presents to the pediatric emergency department with 2 days of nonbilious, nonbloody emesis, along with decreased urine output. The episodes of emesis occur immediately after she eats or drinks, and do not appear to be associated with any abdominal pain. She typically has 7 to 8 wet diapers per day, however, her last wet diaper was 30 hours prior to presentation. She has had no fevers or diarrhea. Her last stool was 2 days prior to presentation. Her grandmother had similar symptoms 2 days prior to presentation and her mother reports that the child and adults all ate the same food.

Our patient had normal vital signs on presentation other than mild tachycardia. Physical examination reveals an awake and active thin young girl with mild dehydration. Her abdomen is soft, nontender, nondistended, and without any masses, and normal bowel sounds are heard throughout.

Complete blood count reveals the following values: white blood cell count 15.9 x 10^3/µL with 81% neutrophils and 14% lymphocytes; hemoglobin 12.8 g/dL; and platelet count 496 x 10^3/µL. Electrolyte testing reveals a sodium of 147 mmol/L; potassium of 3.9 mmol/L; chloride of 99 mmol/L; CO_2 of 24 mm/L; and an anion gap of 24 mmol/L. Renal function tests show a blood urea nitrogen (BUN) of 42 mg/dL and creatinine of 0.34 mg/dL. Liver function tests are within normal limits. She is rehydrated with 20 ml/kg normal saline via bolus infusion, started on maintenance intravenous (IV) fluids, and admitted to the pediatric inpatient service for further management, where a combination of imaging, change in physical exam, and further history gathering leads to a diagnosis.

Discussion/patient course

Upon re-examination the next morning, approximately 8 hours after admission, the patient was found to have had a large amount of dark brown emesis, which appeared to be feculent in nature. An abdominal x-ray demonstrated a non-obstructive bowel gas pattern with a large amount of stool burden. A nasogastric (NG) tube was inserted with a small amount of tan fluid return. She then underwent an upper gastrointestinal (GI) radiographic series with contrast, which demonstrated complete obstruction at the duodenal bulb by a large cyst-like filling defect that indented its posterior wall. An abdominal ultrasound (US) was consistent with a posterior duodenal wall cyst with some areas showing gut signature sign, suggestive of an enteric duplication cyst (EDC). The patient was kept on maintenance IV fluids. Her acute kidney injury resolved gradually, with a decrease in her BUN from 42 to

14 mg/dl, and return of adequate urinary output. She also remained NPO with an NG to low intermittent wall suction for gastric decompression.

The following day on rounds, when we were explaining the ultrasonogram findings, and that the obstruction was thought to be likely caused by a cyst, the patient's mother recalled that the patient had ingested some Orbeez (a water bead made of superabsorbent polymer), approximately 1 week prior to the onset of her persistent emesis. The mother also recalled that she visualized an Orbeez in the last stool that the patient had, before the emesis began. This was immediately relayed to the pediatric surgery team who had been following closely. At that time, we also involved the pediatric gastroenterology team and prepared the patient for an urgent endoscopy.

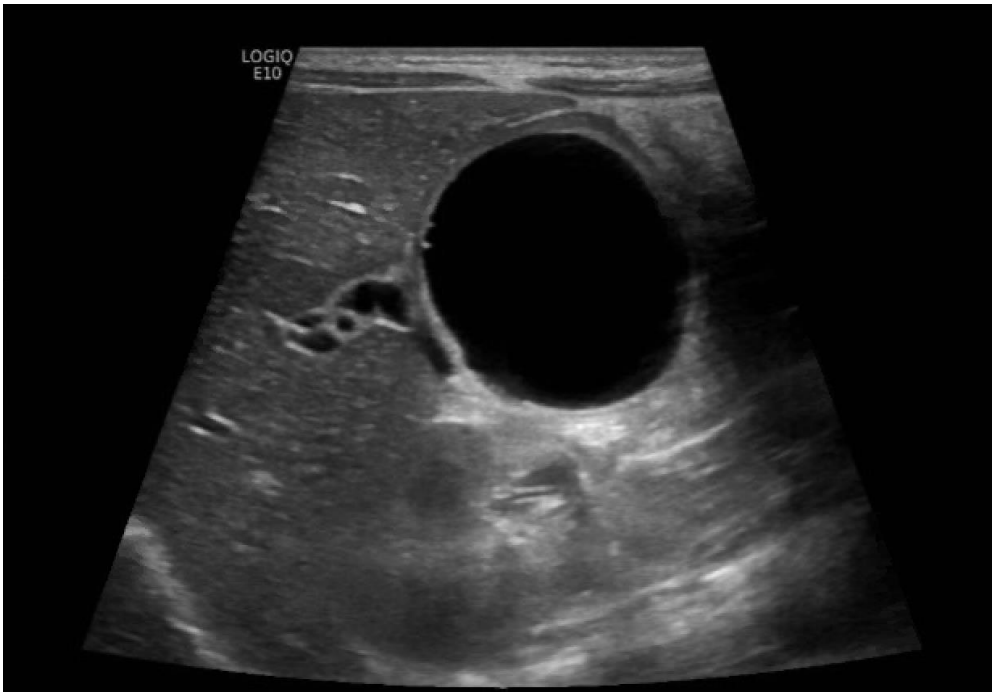

Figure 1: abdominal ultrasound

Differential diagnosis

- Gastroenteritis initially given her exposure to family members with similar symptoms
- Foodborne illness given her exposure to the same foods as those ill family members
- Small bowel obstruction (SBO) secondary to enteric duplication cyst versus duodenal hematoma
- Foreign body ingestion

Initially, based on her presentation, contacts with similar symptoms, and nonbilious and nonbloody emesis, gastroenteritis and foodborne illness were higher on our differential diagnosis. These diagnoses, however, were deemed much less likely after her reexamination after admission demonstrated absent bowel sounds along with the presence of feculent emesis, as these signs are much more suggestive of a SBO, although the cause of which was unclear initially.

The symptoms and signs of SBO are abdominal pain, nausea, vomiting, constipation, obstipation, and abdominal distension. It is one of the most common surgical disorders of the small intestine, with its etiology attributed to either an intraluminal (eg, foreign bodies, meconium), transmural (eg. tumors, EDC, duodenal hematoma), or extrinsic (eg, adhesions, hernias) process. Evaluation and treatment of SBO is generally initiated with fluid and electrolyte management, NPO, NG tube decompression, and abdominal radiographs, which was our initial approach.

EDCs are rare congenital abnormalities found anywhere along the GI tract, mostly commonly in the ileum, and now often diagnosed prenatally. These lesions are closely attached to the GI tract, sharing a common wall, and are lined with the histological wall layers of the GI tract. It is frequently diagnosed with US, with imaging findings including a cystic lesion with the *gut signature sign,* seen in this case, from the inner hyperechoic mucosa and outer hypoechoic muscle layer. EDCs can increase in size gradually, with risk of malignant transformation or obstruction; treatment is surgical resection. Although the patient's imaging findings were highly suspicious for an EDC, the clinical presentation of an acute 2-3 day course of the patient's obstructive symptoms and extremely rare location of an EDC at the duodenum were less consistent with this diagnosis.

An intramural duodenal hematoma can also present with obstructive symptoms. Although it is often an echogenic lesion on US imaging, it may form a hypoechoic cystic lesion also, sharing a common wall with the GI tract as the blood is reabsorbed. In children, this diagnosis is often attributed to blunt abdominal trauma such as motor vehicle accidents or nonaccidental trauma, or those in a hypocoagulable state. Contrary to EDC, these are often managed conservatively, with treatment including NG tube decompression with a goal of enteral feeding. The clinical history and unidentifiable cause was inconsistent with this diagnosis.

Actual diagnosis

An urgent endoscopy revealed a large gelatinous ball, consistent with an Orbeez polymer ball, obstructing the duodenum just past the pylorus, with erythema and superficial ulcerations. Despite the imaging that suggested a potential EDC as the cause of her SBO, identification of the Orbeez strongly correlated with the timeline and presentation of the patient's illness.

The condition

Foreign body ingestions are frequently encountered in the pediatric population. Despite how common these presentations are among cases that come to medical attention only 10-20% require endoscopic retrieval, and <1% of cases require a surgical intervention.[1] Ingestion of Orbeez, or water beads, however, has been associated with SBO in a small number of documented cases[2,3,4] that have required surgical intervention despite the company stating that they are safe to be ingested.[5] This case again demonstrates that Orbeez and other types of polymer water beads should be kept out of the reach of children as they can cause severe problems if ingested.

Treatment/follow up

Following the urgent endoscopy, which revealed an Orbeez, forceps were used to break the foreign body apart, requiring multiple passes, irrigation, and suction. After the procedure, multiple pieces of Orbeez were seen in her stool over the next few days. She was discharged home uneventfully in 4 days, with complete resolution of symptoms. Parents were provided education regarding supervision and the risks of foreign body ingestion in children. Upon follow up discussion via phone with her mother 1 month later, she continued to do well without any complaints.

Figure 2: Large piece of Orbeez visualized in the patient's stool following endoscopy

References

Wyllie R. Foreign bodies in the gastrointestinal tract. *Curr Opin Pediatr*. 2006;18(5):563-4. doi: 10.1097/01.mop.0000245359.13949.1c.

1. Mullens C, Coleman K, Parrish D, Vaughan R. Orbeez ingestion can mimic duplication cysts as a cause of pediatric small bowel obstruction. *Journal of Pediatric Surgery Case Reports*. 2021, 64: 101711 doi: 10.1016/j.epsc.2020.101711
2. Michelakos T, Tanaka M, Patel M, Ryan D. Orbezoar: a superabsorbent polymer causing small bowel obstruction in a toddler. *J Pediatr Gastroenterol Nutr*. 2021;70(2):e48. doi: 10.1097/MPG.0000000000002357

3. Mohamed A, Qoura H, Alshuili I, et al. Bowel obstruction by ingestion of superabsorbent polymer balls, *Journal of Pediatric Surgery Case Reports*. 2019, 41:27-29. doi: 10.1016/j.epsc.2018.11.005
4. Spin Master. General FAQs. Accessed March 28, 2022. https://spinmastersupport.helpshift.com/a/orbeez/?s=general-faqs&l=en&p=web