

Tachypnea and Abdominal Distention in a 5-week-old Boy

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PRESENTATION

A 5-week-old boy born at 35 weeks' gestation develops acute, worsening abdominal distention and tachypnea while recovering from surgical aortic switch, ventricular septal defect (VSD) repair, and placement of a pacemaker for a history of double-outlet right ventricle, transposition of the great arteries, and congenital heart block. His postoperative course is complicated by a wound infection requiring a wound vacuum, septic shock, and bilateral chylothorax that is drained with a chest tube. He is receiving supplemental oxygen support with a nasal cannula at 2 L/min (weaned from 6 L/min of high-flow nasal cannula just 2 days earlier). His blood pressure the past few days has been stable, and he is taking furosemide. For the past 2 days the infant has become increasingly tachypneic, with a respiratory rate of 80 to 90 breaths/min. For nutrition, he is enterally fed with a high-medium chain triglyceride (MCT)-containing formula owing to the postoperative chylothorax, and he is supplemented with parenteral nutrition. His nasal cannula flow is increased to 6 L/min.

He has no fever, cyanosis, diaphoresis, feeding intolerance or tiring with feeds, rhinorrhea, nasal congestion, diarrhea, constipation, or increased fussiness. His anterior fontanelle is open and flat. He has a nasogastric tube in place. He is tachypneic, with deep subcostal retractions and head bobbing; however, no crackles, rhonchi, or stridor is noted. He has good aeration bilaterally. Normal S1 and S2 heart sounds are noted. A grade II/VI systolic ejection murmur is heard best at the left upper sternal border radiating to the left lower sternal border due to a small residual VSD and a posterior septal VSD. His abdomen is soft and nontender but distended. No masses are palpated, and there is no evidence of ascites. A venous blood gas is consistent with respiratory acidosis with metabolic compensation. An abdominal radiograph reveals the diagnosis (Fig 1).

DIAGNOSIS

A frontal abdominal radiograph reveals a soft tissue density mixed with air in the fundus of the stomach, consistent with a lactobezoar.

DISCUSSION

A lactobezoar is a collection of milk or formula in the gastric or intestinal lumen. It is an acid-insoluble bezoar, different from trichobezoars, phytobezoars, food bezoars, or medication bezoars because it contains milk and mucus components.

AUTHOR DISCLOSURE Drs Rai, Cantor, and Kogan-Liberman have disclosed no financial relationships relevant to this article. This commentary does not contain a discussion of an unapproved/investigative use of a commercial product/device.

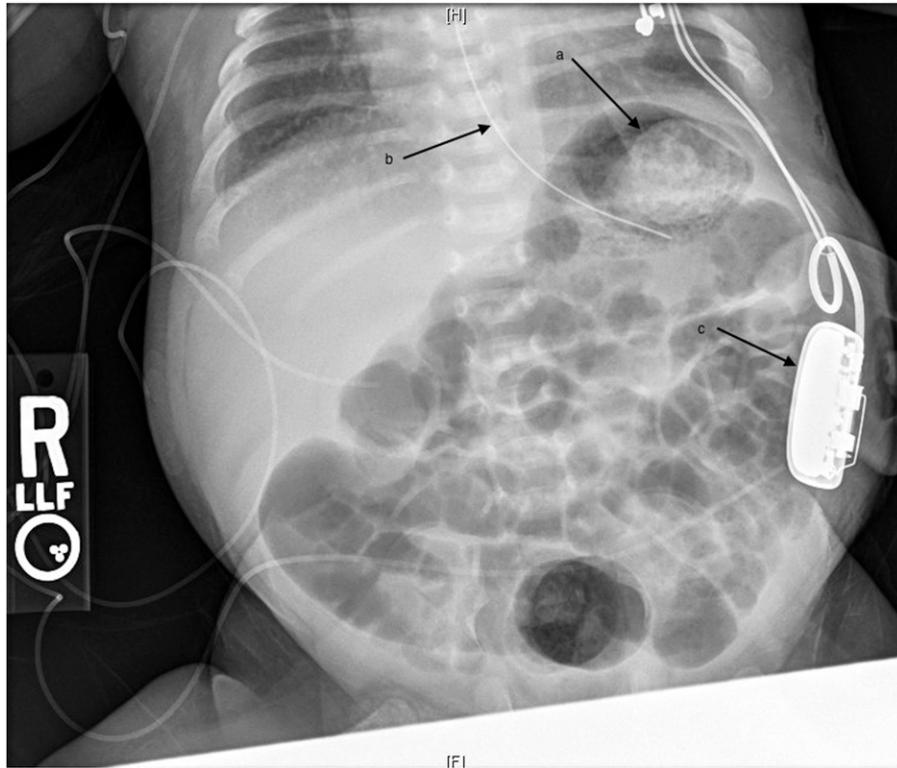


Figure 1. A frontal abdominal radiograph of the patient reveals a soft tissue density mixed with air in the fundus of the stomach (a). A nasogastric tube (b) and cardiac pacemaker (c) are visible.

(1) Most are located in the stomach, but some case reports have described locations in the upper and lower intestine. (1)(2) Most lactobezoars are diagnosed in premature neonates. Unfortunately, the true prevalence of lactobezoars is not known because it is a rarely reported disorder. As of 2014, only 96 cases have been described since its first report in 1959. (2)

Lactobezoars are thought to result from the coalescence of milk and mucous proteins secondary to abnormal gastric function. (1)(3) Dehydration and impaired gastric motility (secondary to medications that reduce vomiting or antagonize gastric secretion and motility) are risk factors. (2) Dehydration can lead to intestinal precipitation of contents due to increased water reabsorption. Premature and low-birthweight infants may be at increased risk for dehydration and have immature digestive function with decreased gastric acid production and pepsin activity. (1)(3) The high osmotic load from undigested milk may incite vomiting or diarrhea, precipitating dehydration and, thus, leading to increased water reabsorption and bezoar formation. Furthermore, the use of diuretics can precipitate dehydration and have been associated with lactobezoar formation in case reports. (2) Antimotility or antiemetic agents can contribute to increased coagulation of gastric protein due to intraluminal stasis of contents and decreased absorption. (1)(3) Elevated concentrations of intraluminal

calcium, phosphorus, and fat from milk protein can enhance surface tension, facilitating the formation of lactobezoar.

Compositions of certain formulas have been associated with lactobezoar formation. In particular, formulas high in MCT have been associated with lactobezoar formation. (4) High-MCT formulas are commonly used in infants with chylothorax or long-chain 3-hydroxy-CoA dehydrogenase deficiency. (4) Such formulas may reduce chylothorax because MCT is directly absorbed into the portal venous circulation, reducing lymph flow and allowing the lymphatic leakage to heal. (4) MCTs, however, may facilitate lactobezoar formation by delaying gastric emptying. (1) Nevertheless, there is no evidence to support a causal relationship between MCT consumption and lactobezoar. Furthermore, lactobezoars may occur in both breastfed and formula-fed infants. (5)

A wide differential diagnosis exists for neonates presenting with tachypnea and abdominal distention. Life-threatening conditions include volvulus, intussusception, intestinal perforation, pneumothorax, necrotizing enterocolitis, and sepsis. Cardiac malformations and pneumonia can also present with tachypnea. Less common causes of abdominal distention include intra-abdominal tumors.

Lactobezoars can be asymptomatic, but more than 80% of patients present with gastrointestinal symptoms. (1) Most commonly, patients present with abdominal distention,

vomiting, diarrhea, and regurgitation. (1) Other less common presenting symptoms include dehydration, respiratory distress, and cardiovascular symptoms such as bradycardia and tachycardia. (1) In some patients, delayed diagnosis can result in intestinal obstruction, leading to necrotizing enterocolitis or intestinal perforation. (6) The diagnosis is most commonly made by plain abdominal radiography (62%) and, less commonly, with contrast enema (18%) or abdominal ultrasonography (12%). (1)(6) In rare cases, surgery (9%) or endoscopy (2%) is required for diagnosis. (1)(4)

Management typically involves expectant management. Oral feedings should be withheld, and parenteral fluids should be administered. More than 85% of cases have led to resolution of lactobezoar with such conservative approaches. (1) Nasogastric tube decompression is also helpful to relieve distention. N-acetylcysteine (NAC), a mucolytic agent, has been administered at 10% concentration at a dose of 10 mg/kg per dose via nasogastric tube to help dissolve the lactobezoar. (3) NAC works by severing the disulfide bonds in the mucus, thus reducing its viscosity. (4) A minimum of 6 doses of NAC have been described in the literature for success of resolution of lactobezoars, although it is not approved for this indication. The most common adverse effects of NAC are nausea and vomiting, and prolonged use may be associated with elevation of aminotransferases.

Resolution is typically seen within several days of therapy. (1) Lactobezoars have excellent outcomes if diagnosed and managed in an appropriate time. If not recognized early, however, the patient may develop shock due to an acute abdomen. (6) Lactobezoars that are unable to be dissolved within 72 hours warrant surgical treatment. (1) Surgery may be indicated sooner if there are signs of acute abdomen due to bowel perforation or pneumoperitoneum. (6)

PATIENT COURSE

Enteral nutrition was held, and the nasogastric tube size was increased to a larger caliber to facilitate the flushing and aspiration of the lactobezoar. The patient was given a gastric lavage of 10% NAC at 10 mg/kg per dose diluted in 50 mL of normal saline via nasogastric tube. Immediately after administration of the lavage, the nasogastric tube was clamped for 2 hours, followed by the gastric aspiration. Overnight, due to increasing respiratory distress, the patient was intubated and placed on pressure control ventilation. He received 2 cycles of NAC lavage, 6 hours apart. An abdominal radiograph 12 hours after initiation of the gastric lavage showed resolution of the lactobezoar (Fig 2). In addition, the patient's respiratory status improved and he was subsequently extubated and weaned to noninvasive ventilation. MCT formula feeds were slowly

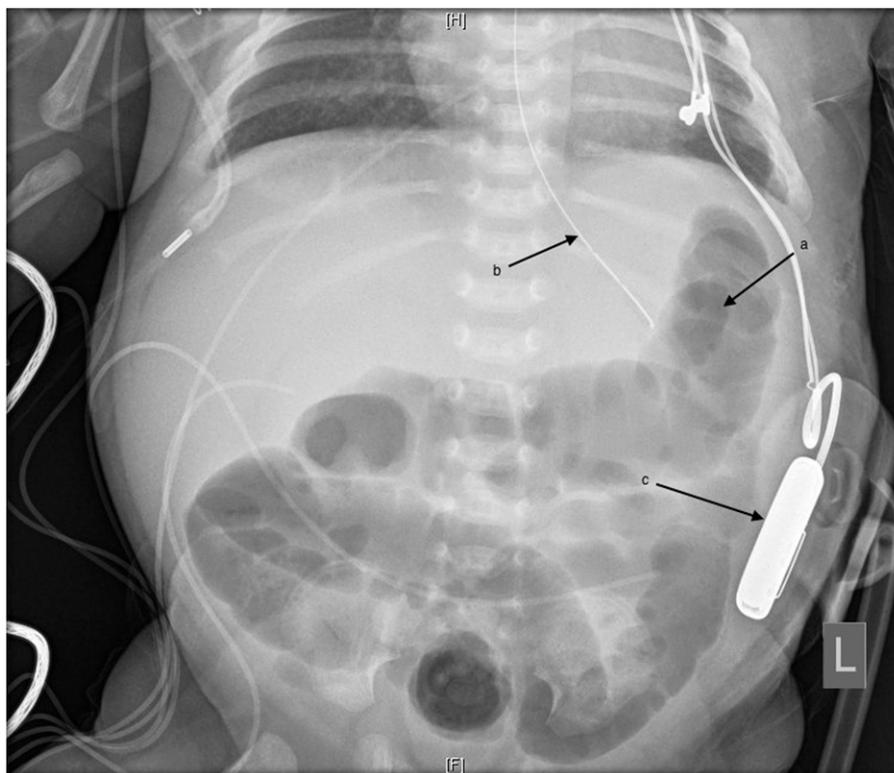


Figure 2. Repeated radiograph 24 hours after the previous radiograph and 12 hours after the initiation of gastric lavage demonstrates normal gaseous distention of the gastric fundus without lucency, consistent with resolution of lactobezoar (a). A nasogastric tube (b) and cardiac pacemaker (c) are present.

restarted and advanced to goal volume over 3 days. He then tolerated regular infant formula and had no recurrence of lact bezoar or any other feeding problems.

Summary

- Lact bezoar should be considered in a neonate with respiratory distress and abdominal distention.
- Lact bezoar has been described in premature infants on certain formulas, but they can also occur in full-term infants on human milk.
- If lact bezoar is suspected, rapid diagnosis and treatment is essential to prevent serious complications, such as necrotizing enterocolitis or bowel perforation.

References

1. Heinz-Erian P, Gassner I, Klein-Franke A, et al. Gastric lact bezoar: a rare disorder? *Orphanet J Rare Dis.* 2012;7:3
2. Sparks B, Kesavan A. Treatment of gastric lact bezoar with N-acetylcysteine. *Case Rep Gastrointest Med.* 2014;2014:254741
3. Mai TT, Godfred-Cato SE, Takemoto DM, Jatla M. 10-week old infant with lact bezoar. *Ann Pediatr Child Health.* 2014;2(3):1021
4. Prah M, Smetana D, Porta N. Lact bezoar formation in two premature infants receiving medium-chain triglyceride formula. *J Perinatol.* 2014;34(8):634–635
5. Bos ME, Wijnen RM, de Blaauw I. Gastric pneumatosis and rupture caused by lact bezoar. *Pediatr Int.* 2013;55(6):757–760
6. Jain A, Godambe SV, Clarke S, Chow PC. Unusually late presentation of lact bezoar leading to necrotising enterocolitis in an extremely low birthweight infant. *BMJ Case Rep.* 2009;2009:bcr03.2009.1708

Visual Diagnosis: Tachypnea and Abdominal Distention in a 5-week-old Boy

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