aspirated bezoar in a pediatric patient: a case report

Lynn Macksey, CRNA, MSN
Pittsburgh, Pennsylvania

This case report describes an 11-year-old boy with a known esophageal bezoar admitted to surgery for esophagogastro-duodenoscopy with biopsy and possible removal of the bezoar. On induction, a copious amount of fluid and solid food particulate was noted in the posterior oropharynx, interfering with immediate intubation. After clearing of the oropharynx, the patient was intubated. A bronchoscopy revealed aspirated food materials. A stat intraoperative consultation was initiated for rigid bronchoscope with bronchial suctioning to clear aspirated undigested food particles and an esophagoscope to remove the bezoar mass in pieces. Postoperatively, the parents were notified that the jejunal mass would require further workup with possible surgical removal.

Key words: Aspiration, bezoar, chronic rumination, microgastria, pediatric.

Gastric bezoars are persistent, ingested materials that accumulate within the gastrointestinal tract. Also crudely described as a hairball, a bezoar can be due to anatomical defects or functional abnormalities, but also may occur in patients with particular eating habits, such as excessive consumption of a bulk laxative or chewing gum. Predisposing factors also include inadequate chewing of food, high-fiber diets, and previous gastric surgery.

Classified into several main types, they are named according to the materials of which they are composed: phytobezoars are made of vegetable fibers or plant material; trichobezoars are a result of ingestion of human hair, seen most often in young women; pharmacobezoars contain accumulated masses of a medication; and undigested milk bezoars, called lactobezoars, have been described in premature infants and in full-term infants who receive concentrated formulas.

Bezoars that begin to form in the stomach can pass into the small bowel, where they occasionally cause obstruction. Rapunzel syndrome, first described by Vaughan and coauthors\(^1\) in 1968, is a gastric trichobezoar with a long tail extending to or beyond the ileocecal valve, frequently resulting in obstruction.\(^2\)

Bezoars are most common in the pediatric age group and have been associated with mental retardation, emotional disturbances, and/or pica, an abnormal craving or appetite for nonfood substances, such as dirt, paint, or clay. The most important etiologic factor is a gastric motility disorder, often due to surgery (eg, antrectomy).\(^3\)

A bezoar can be asymptomatic or cause diffuse dyspeptic symptoms, including abdominal or epigastric pain, nausea and vomiting, early satiety, weight loss, hematemesis due to gastric irritation, and diarrhea or constipation. Alopecia and halitosis also may be present.

Although the diagnosis often can be made on the basis of findings of conventional radiography and barium studies, computed tomography scan has been shown to be a more useful imaging modality to rapidly detect bezoars than conventional abdominal radiographs or sonography.\(^4\) Computed tomography exhibits a quite characteristic bezoar image; in addition, this imaging technique reveals the presence of additional gastrointestinal bezoars.\(^5\)

Treatment is medical if possible (using enzymatic preparations and drugs that enhance gastric motility, such as metoclopramide); however, large trichobezoars often need surgical treatment.

Case report

An 11-year-old boy was admitted for a scheduled esophagogastroduodenoscopy with biopsy and possible removal of bezoar. The child was known to have inadequate peristaltic activity and to pass constipated stool approximately every 3 days. He had a history of microgastria, and had undergone the Hunt-Lawrence procedure with esophagojejunostomy and creation of a gastrojejunal pouch at 1 year of age. The admitting progress note stated that the “patient is growing well but has poor weight gain, chronic rumination and sharp shooting pain in area of left hemidiaphragm, with only some improvement with medical management.” According to the medical history report in the chart, the patient “may have had bezoars removed in distant past.” An upper gastrointestinal endoscopy, done on December 28, 2004, showed a bezoar in the neo gastric pouch; however, there was no stated intervention at that time. A gastric emptying study on Jan-
uary 11, 2005, revealed markedly delayed jejunal pouch–esophageal emptying with no mention of a bezoar. Current medications included metoclopramide (Reglan), gabapentin (Neurontin), cyproheptadine (Periactin), liquid nutritional supplement, multivitamins, and calcium. The boy’s weight was 36.6 kg, and he had no known drug allergies.

The medical history included the following: born at 36 weeks’ gestation and no ventilator needed; gastroesophageal reflux disease, microgastria, chronic ruminantion, and chronic abdominal pain; a mirror movement disorder (had received some physical and occupational therapy in the past); a stable cervical spine; and well-controlled asthma (no episode for months; no hospital admissions or recent corticosteroid use). The lungs were clear to auscultation. Neurontin had been prescribed for complaints of chronic visceral hyperalgesia in the left hemidiaphragm.

The surgical history included an orchipexy twice and a Hunt-Lawrence procedure with esophagojunostomy and creation of a gastrojejunal pouch at 1 year of age.

The boy was admitted to the preoperative area accompanied by his parents. He had ingested no solids since the previous evening at 8:30 PM and had ingested approximately 60 mL of Gatorade at 7:00 the morning of surgery. Preoperative area vital signs were documented as follows: blood pressure, 110/70 mm Hg; heart rate, 80 beats per minute; and respiratory rate, 20 breaths per minute; the oral temperature was 36.2°C. Premedicated with midazolam 15 mg by mouth in the preoperative area, the child was already sleepy and sedated before being taken into the surgical area. Anesthesia time started at 9:13 AM when the child was taken to the operating room via stretcher, transferred onto the OR bed, and covered with warm blankets. A pulse oximeter, an electrocardiographic monitor, and blood pressure cuff were applied. The initial vital signs showed a blood pressure of 104/58 mm Hg and a heart rate of 82 beats per minute; the oxygen saturation was 100%.

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A smooth inhalation induction with nitrous oxide at 4 L, oxygen at 2 L, and sevoflurane 8% was followed with insertion of an intravenous (IV) line, and 70 mg of IV propofol was given. A laryngoscope with a Miller 2 blade was inserted into the mouth. Once the epiglottis was lifted, a copious amount of greenish beige liquid with soft particulate matter was noted at the back of the throat, just above the esophageal entrance. The laryngoscopist verbally stated what was visualized and began to attempt to suction the liquid from the back of the throat by using a soft suction catheter. The particulate matter was too large for the soft suction catheter, and the use of a Yankauer suction appliance was attempted. The particulate matter was still too large; matter was removed by sucking solid particulate against the Yankauer head, withdrawing out of oropharynx, and wiping it off onto a towel. The reinsertion and withdrawal of the Yankauer section catheter was done multiple times.

After multiple attempts to clear the airway during patient apnea, the pulse oximeter showed a slow descent of the oxygen saturation. When the saturation decreased to 92%, an oxygen mask was applied. The child was given oxygen with continuous positive airway pressure of +5 cm H2O; the oxygen saturation dropped to 90% briefly after the face mask was applied, continuous positive airway pressure with oxygen was continued, and very gentle, shallow respirations were given until the pulse oximeter reading for oxygen saturation was 100%.

Once the pulse oximeter showed a saturation of 100%, the patient was suctioned several more times until all visualized particulate and liquid matter was removed for safe intubation. While the airway was suctioned, 20-mg IV bolus of propofol were titrated to maintain stage 3 anesthetic depth.

The laryngoscope was reinserted, followed by 2 mL of 1% lidocaine by nebulizer to blunt the laryngeal cough reflex. The child then was intubated orally with a 6.5F endotracheal tube. Once intubated, bilateral anterior breath sounds were auscultated; audible, coarse breath sounds in the bilateral upper lobes were found.

A flexible fiberoptic scope was inserted bronchially by the anesthesiologist. A scant amount of food particulate matter was noted in the trachea and main left and right bronchi. This finding was verbalized to the gastrointestinal surgeon, and the flexible bronchoscope was removed.

The gastrointestinal surgeon inserted an esophagogastroduodenoscopy fiberoptic scope and noted several very large esophageal–jejunal pouch bezoars that were too large to remove by scope. Multiple attempts to irrigate and remove the esophageal bezoar in pieces were made without success. Discussion was held about the likelihood of the patient passing such a large bezoar without intervention, the difficulty of more food intake passing around the mass already present, and the risk of increased pulmonary aspiration.

An urgent intraoperative consultation was called to the on-call ear, nose, and throat (ENT) surgeon, who was present at the hospital, regarding the vegetative matter retained in the esophagus and trachea. The ENT and gastrointestinal physicians spoke with the
child's parents and received consent for direct laryngoscopy and bronchoscopy, removal of the foreign body, and possible esophagoscopy. During this time of decreased surgical stimulation, general anesthesia was maintained but the inhaled volatile agent was reduced to 0.5 minimum alveolar concentration; a stable blood pressure and heart rate were maintained throughout. The child was covered with a warming blanket continuously. Oxygen saturation readings remained greater than 98% during this time.

After receiving parental consent, the ENT surgeon initially introduced a large 18F orogastric tube into the gastrojejunal pouch. Aggressive flushing and withdrawal of fluid under pressure with a Toomey syringe was unsuccessful in breaking up the bezoar. The operating room bed then was turned to a 90° field avoidance position. A fraction of inspired oxygen of 100% and sevoflurane at 1 minimum alveolar concentration, with an increased respiratory rate, was accomplished before the ENT surgeon extubated the patient. A tooth guard was placed in the upper maxilla, covering the teeth before the rigid laryngoscope-bronchoscope was inserted into the trachea. At this time, the ventilator circuit was attached to the bronchoscope port to oxygenate the patient while continuing the inhaled anesthetic. Propofol also was given intermittently in 20- and 30-mg IV boluses to maintain anesthetic depth. After the bronchi were cleared of solid particulate matter, the patient was reintubated by the ENT surgeon.

An esophagogastroscopy tube then was inserted into the upper esophagus and moved distally toward the jejunal pouch (Figure 1). When food masses or particles were encountered, collapsible netting on looped wire was inserted through the esophagogastrscopy tube, food scooped and enclosed in the netting, and pulled out and discarded.

This maneuver continued until the entire esophagus was cleared of solid particles, in approximately 90 minutes. Though the esophagus was cleared, a large mass of particles remained in the jejunal pouch. It was noted that this mass might require surgical removal because of its solidness and size (Figure 2).

The head of the bed was turned back to its original position, and a Yankauer suction catheter was ready. The inhalation agent was stopped, and the mouth and back of throat were suctioned thoroughly. The head of the bed was placed in a reverse Trendelenburg position at approximately 25° to 30°. After sustained head lift and purposeful movement, the endotracheal tube cuff was deflated and the tube was removed. The mouth was suctioned again, and care was taken not to trigger the gag reflex. No further fluid or solid material was suctioned from the oropharynx.

The child was transferred to a stretcher and turned onto his side with the head of the bed elevated 30°. A face mask with a 10-L oxygen flow was applied and maintained throughout the report to the nurse in the postanesthesia care unit (PACU) at 2:10 PM. In the PACU, the head of the bed remained in a reverse Trendelenburg position, and the child was monitored for airway swelling and/or aspiration for an additional 2 hours. The PACU course ended uneventfully. At discharge, the parents were instructed to call the surgeon immediately about any signs of breathing difficulty.

**Discussion**

Although the pathogenesis of bezoar formation after gastric surgery is not clear, bezoars are a complication of gastric procedures and are becoming increasingly
recognized as a cause of intestinal obstruction due to an alteration in gastric emptying.

After gastric resection with an intact vagus, the majority of bezoars are found in the small intestine with increased particle size of food. However, when vagotomy is performed, the bezoar is located most frequently in the stomach. Any somewhat indigestible material (eg, potato skin) has the chance to form a compact mass. Other precipitating factors are incomplete mastication because of rapid deglutition, poor dentition, edentulism, and dehydration.6

Clinical manifestations depend on the location of the bezoars. Gastric bezoars cause mostly nonspecific symptoms (eg, epigastric pain, dyspepsia, occasional vomiting, and postprandial fullness). The most common clinical manifestations of an intestinal bezoar are complete or partial mechanical intestinal obstruction. Once the obstruction occurs, surgery is the only way to solve the problem. Frequently, synchronous bezoars are found in the stomach or other areas of the gastrointestinal tract. Therefore, it is mandatory to explore completely the gastrointestinal tract to avoid recurrence of intestinal obstruction due to retained bezoar.

This patient had undergone a Hunt-Lawrence gastric reconstruction procedure at the age of 1 year for microgastria. One study compared 3 different methods of gastric reconstruction for gastrointestinal tract continuity postoperatively: “Roux-Y anastomosis-10 patients (19.2%); esophago-jejunal ‘end to side’ anastomosis-8 patients (15.4%); Hunt-Lawrence-Rodino anastomosis-34 (65%).”7 Of these 3 procedures, the authors “concluded that the best results were achieved when continuity of gastrointestinal tract after total gastrectomy was reconstructed with intestinal (first loop of jejunum) pouch creation (Hunt-Lawrence procedure). This method warranted high quality of life and low incidence of complications.”

In a patient with a known presence or history of a bezoar, general anesthesia should be induced carefully. Food particles and liquid may be present in the back of the throat, and, as in our case, food particles may already be present in the respiratory airways or may be forced into the trachea and bronchi with even gentle ventilation. As with any induction scenario, suction must be present, but in these special cases, large suctioning devices also should be available.

Because of its potential to cause mortality and associated morbidity, patients with previous gastric surgery should be warned about this preventable complication and be given dietary advice. In addition, physicians should be aware of this possibility in the differential diagnosis for all patients with mechanical small bowel obstruction.

REFERENCES

AUTHOR
Lynn Macksey, CRNA, MSN, is a nurse anesthetist at University of Pittsburgh Physicians, St Margaret’s Hospital, Pittsburgh, Pa. She was a student at the University of Pittsburgh School of Nursing Nurse Anesthesia Program, Pittsburgh, Pa, at the time this paper was written. Email: LynnMacksey@msn.com