

Overtube-assisted removal of an enteral feed bezoar: a case report

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Dear Editor,

Bezoars are retained concretions of indigestible conglomerations causing various degrees of obstruction within the gastrointestinal tract, most commonly in the stomach; however, occasionally, bezoars originate in the esophagus, resulting in esophageal obstruction [1]. Altered gastrointestinal anatomy and/or motility, supine position, low gastric acidity, diabetes mellitus, neurological conditions, hypothyroidism, other medical conditions, and some medications are predisposing factors for bezoar formation [2].

Enteral feeding by a nasogastric tube (NGT) is a standard form of medical care for patients in the intensive care unit (ICU) due to convenience, low cost and good safety profile [3, 4]: the enteral route tends to attenuate the mucosal barrier breakdown subsequent to bacterial translocation [5]. Bezoar formation due to enteral feeding represents an uncommon complication of malposition of the NGT [6–12].

The following is a report of a case in which a patient with a wide esophageal enteral feed bezoar was managed successfully and quickly by overtube-assisted endoscopic removal.

Written consent was obtained from the patient's relatives for the study and for publication of this case report.

An 80-year-old male patient was admitted to our ICU in a coma with a Glasgow Coma Scale score (GCS) of 6/15 (E4V1M1) after viral encephalitis with spontaneous breathing through a tracheostomy tube. His BMI was 26 kg/m². He suffered from schizoaffective

tive disorder, was under pharmacological treatment, and had arterial hypertension, non-insulin-dependent diabetes mellitus, osteoporosis, and chronic hepatitis C.

He received total enteral feeding by NGT (Nutricia FloCare, 14-French Polyurethane [PUR] fine-bore tube, length 110 cm). The NGT tube tip position was confirmed using low chest radiography to be in the gastric antrum. He was started on Jevity Plus (Abbott Nutrition) enteral feeding at 1000 mL per day plus 1 sachet twice a day of Abound (Abbott) dissolved in 250 mL of physiological solution as a protein supplement. Medications administered through the NGT were nebivolol, acetylsalicylic acid, lansoprazole, amlodipine, and doxazosin.

On the 12th day of enteral feeding, the NGT tube tip position on low chest radiography was at the passage between the cardia and gastric fundus. On the 13th day of enteral feeding, due to the patient's neurological condition and planning his further admission to a rehabilitation center, the NGT was removed and the patient underwent esophagogastroduodenoscopy at the ICU for percutaneous endoscopic gastrostomy (PEG) tube placement, which identified a hard, yellow concretion causing a complete obstruction of the esophagus at 30 cm from the incisors (Figure 1). A new NGT could not be inserted. Subsequently, thoracic and upper abdomen computed tomography (CT) scans without contrast agent was performed and showed that the length of the enteral feed bezoar was about 7 cm and it completely filled the distal esophageal

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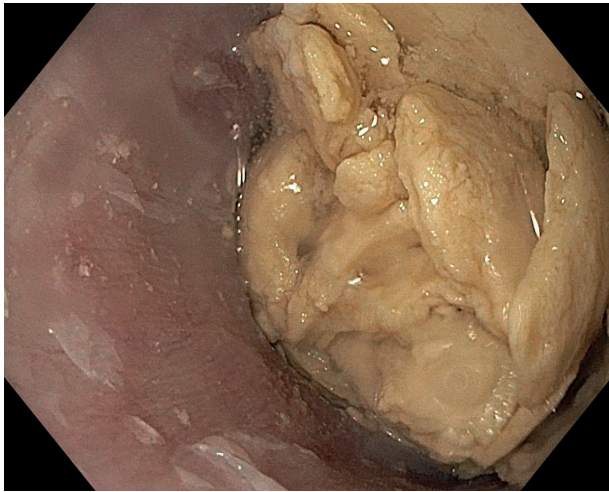


FIGURE 1. Endoscopic view of blocked esophagus with hard, yellow concretion

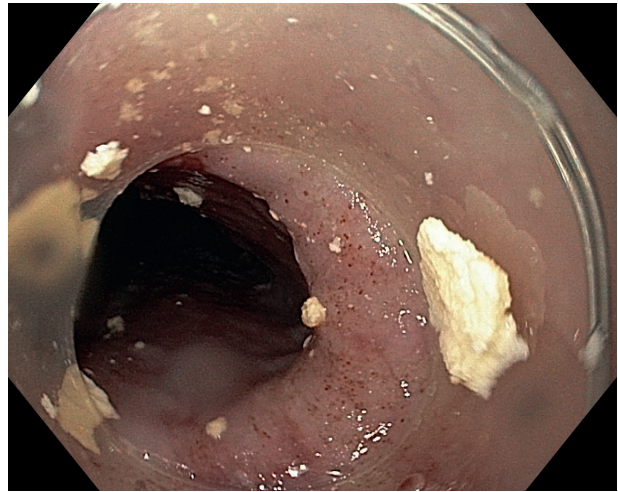


FIGURE 2. Guardus overtube 25 cm in length in the esophagus

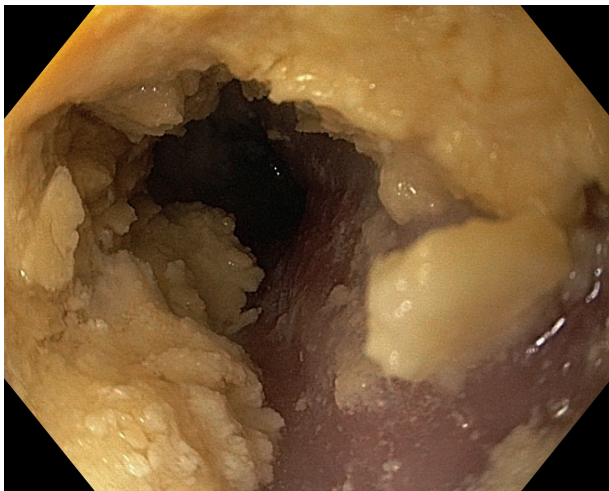


FIGURE 3. Central tunnel extending to the stomach, created using the tip of the retrieval net and portable suction aspirator

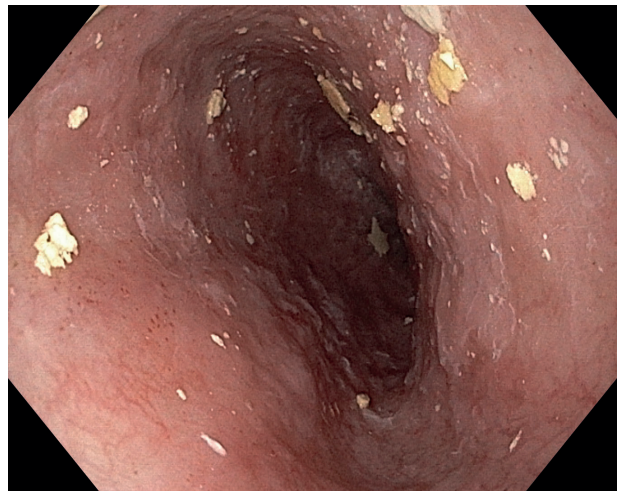


FIGURE 4. Endoscopic view of patent esophagus without mucosal damage after bezoar removal

lumen with associated increased esophageal wall thickness.

After the CT scan, the bezoar was safely and quickly removed under the guidance of a Guardus Overtube (Steris) 25 cm in length, using both endoscopy devices, such as a retrieval net and a tripod grasper, and a portable suction aspirator (Figure 2). Partial removal of the enteral bezoar was performed by fragmentation and retrieval by the oral route. Then under water irrigation of the endoscope and simultaneously using a portable suction aspirator the tip of the retrieval net was used to crush the bezoar and create a central tunnel extending to the stomach (Figure 3). The residual bezoar lining the esophagus was fragmented and pushed into the stomach. No mucosal damage after esophageal

bezoar removal was documented (Figure 4).

Bezoar formation is an uncommon and insidious enteral nutrition complication. Enteral feed bezoars formed during NGT feeding consist of clotted casein (the major protein constituent of milk feeding formula), medications, as well as bacteria, foci of calcifications and cells of the gastrointestinal mucosa [6–8]. Most reports of enteral feed bezoars are related to NGT misplacement in the distal esophagus, as in our case [12], and their removal represent a challenge. The pathogenesis of esophageal bezoar formation following enteral nutrition varies; however, in an in vitro study, Irgau *et al.* [13] found that stasis of enteral feed formula and its fiber does not cause solidification by itself, but that it is due

to acid gastroesophageal reflux. Casein in the enteric formula clots upon esophageal acid exposure, resulting in bezoar formation [10]. Marcus *et al.* [6] postulated that casein-based enteral feeding, when exposed to a pH of less than 5, could solidify within 5 minutes, especially in the case of formulas deficient in enzymatic substances such as pepsin and pancreatic enzymes [6, 7, 9, 14]. In an in vitro study, Turner *et al.* [14] confirmed this postulate; a similar condition occurred in the third distal esophagus during acid gastroesophageal reflux, as probably happened in our case.

Critically ill patients in the ICU have many factors predisposing to acid gastroesophageal reflux such as supine position, diabetes mellitus, neurological disorders, obesity, mechanical

ventilation, hypothyroidism, achalasia, peptic ulcer, casein-based enteral feeding and some bezoar-forming medicines such as sedative analgesic drugs, drugs containing cellulose acetate, cholestyramine, aluminium, sucralfate and acetylsalicylic acid. All considered, in our case, several risk factors were identified for the formation of the esophageal bezoar, including acid reflux, gastric stasis, the patient's pathological condition – diabetes mellitus, neurological disorders, and hypothyroidism – and casein-based enteral feeding (Jevity Plus, Abbott Nutrition) through an NGT that was unfortunately displaced in the distal esophagus [8, 10, 14–18].

The NGT increases the risk of gastroesophageal reflux since it may induce relaxation of the lower esophageal sphincter and interfere with normal esophageal motility and sphincter function [15, 19]. Radiographic confirmation of the proper placement of the NGT within the stomach is crucial and is considered to be the gold standard [20]. However, even after radiographic confirmation, NGT has been reported to be displaced (e.g. vomiting or in delirious patients) [7, 20, 21]. While routine chest radiography is the gold standard to check NGT insertion, in daily practice, air insufflation and auscultation methods are mostly used to check the correct position of the NGT inside the stomach, and radiology is performed only to answer specific clinical questions, as in our case [3].

In our case, two days before endoscopic identification of the bezoar, low chest radiography showed the tip NGT position at the passage between the cardia and the gastric fundus. This partial displacement was underestimated because the NGT was functioning properly. In our case, in a few days the NGT misplacement along with casein-based enteral feeding and some crushed bezoar-forming tablets such as drugs containing cellulose acetate, aluminium, and acetylsalicylic acid led to a complete obstruction of the esophagus by the pharmacobezoar, but not of the NGT, resulting in

an endoscopic incidental finding in an asymptomatic patient. In contrast to our case, the diagnosis of esophageal bezoar is usually performed by radiological and endoscopic tests following some presenting symptoms such as regurgitation of the feeding formula, aspiration pneumonia, tracheal compression, and bowel occlusion [6–8].

Some measures to prevent esophageal bezoar formation should be implemented, such as feeding in a semi-recumbent position, regular flushing of the NGT, radiological periodic checking of the NGT tip, as well as considering administration of prokinetic agents and potentially the endoscopic position of the NGT for feeding [6, 9, 21]. In our case, although the patient was fed in a semi-recumbent position with a regular infusion rate by an NGT that was regularly flushed and with periodic radiological checking of the NGT tip, the partial displacement of the NGT could lead to serious complications due to bezoar formation (e.g. malnutrition, pharmacological malabsorption, ulcerations of the esophageal mucosa up to the perforation, bleeding, intestinal obstruction and the need for life-saving surgery).

Treatment of enteral bezoars is a challenge, and no standardized approach is available; treatment modalities include endoscopic removal, effervescent liquids (e.g. Coca-Cola) to soften the mass, dissolution of the mass using pancreatic enzyme extract or bicarbonate solution, laser lithotripsy fragmentation, and surgical removal [4, 21–23]. Esophago-gastroduodenoscopy is considered the best diagnostic as well as therapeutic tool for gastrointestinal bezoars [6, 13]. Successful endoscopic treatment involves dissolution, fragmentation and retrieval of bezoars. Endoscopic management of a bezoar in the esophagus is demanding to treat, especially due to certain risks such as aspiration during fragmentation and mucosal damage during retrieval, which can be reduced by a protective device such as an overtube. Overtube-assisted endoscopy is also useful because of multiple pas-

sages of the endoscope, especially for a larger bezoar, as in our case, where we successfully, safely, and quickly treated a large bezoar that was occluding all the lumen of the distal esophagus using the Guardus Overtube (Steris) to guide endoscopy devices such as a retrieval net and tripod grasper as well as a portable suction aspirator.

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