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Case Report

Esophageal bezoar formation: case report and review of the literature

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Abstract: The provision of enteral nutrition through a nasogastric tube is a routine procedure in the intensive care unit (ICU), but it can lead to complications from intestinal intolerance, such as aspiration. This case report highlights a rare esophageal bezoar complication in a 43-year-old male paraplegic patient with multiple traumas who developed high paraplegia and lost spontaneous respiration, requiring invasive ventilation and nasogastric tube enteral nutrition. Despite 28 days of nutritional support, the patient experienced regurgitation and esophageal obstruction, which was confirmed on CT and endoscopy to be an esophageal bezoar, leading to worsened energy deficiency and clinical exacerbation. Conclusion: This case illustrates the rare occurrence of an esophageal bezoar formation in a patient with high-level spinal cord injury, resulting in compromised respiratory and gastrointestinal functions. Esophageal bezoars can cause regurgitation and may worsen prognosis.

Keywords: Paraplegia, esophageal bezoar, enteral nutrition, critical care

Introduction

The provision of enteral nutrition through a nasogastric-tube is a routine and essential procedure involving the physiologic functional upper gastrointestinal tract, and a tube is used to provide nutrition to patients with nutritional risk in intensive care units [1-3]. However, enteral nutrition can also lead to severe complications, despite the established safety and convenience of this strategy [4]. Serious complications, including severe disturbances in electrolytes and tracheal aspiration of the gastric contents, have been reported [5]. Therefore, these complications of enteral nutrition are also worthy of attention in clinical practice, such as the formation of esophageal bezoars, a rare but potentially serious complication of the provision of nasogastric tube nutritional support [6]. The possible causes can include: reduced swallowing function in stroke patients; frequent replacement of the nasogastric tube due to gastroesophageal reflux, which requires the patient to be kept on his or her back; the use of dietary formulations containing high concentrations of casein; and the use of common intensive care unit medications that can cause gastric hypomotility and delay the gastric emptying process [7-10]. The aim of this study was to report a case in which a patient with paraplegia who received enteral nutritional support experienced a rare complication and developed an esophageal bezoar. Analysis of the occurrence of this complication may reveal the causes and the processes by which esophageal bezoars form. This highlights the need to remain vigilant about this possibility in patients with swallowing disorders, as it can worsen prognosis.

Case presentation

A 43-year-old male patient was injured by a heavy object for 10+ days and diagnosed with multiple injuries and a cervical spine fracture in the intensive care unit of a local hospital following the relevant examinations on June 1, 2024. He was in shock and immediately underwent exploratory laparotomy and liver-preserving hemostasis. On June 12, 2024, he was subsequently transferred to our intensive care unit (ICU) for further treatment. Upon ICU admission, the patient's blood gas analysis showed: PH 7.33, PCO_2 46 mmHg, PO_2 64 mmHg, Na^+

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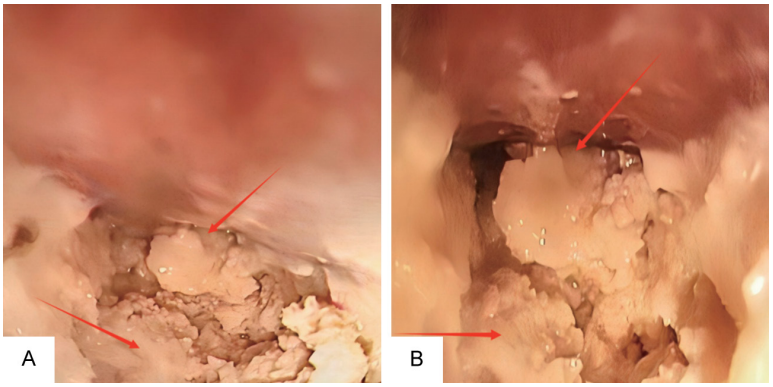

Figure 1. Endoscopy revealed an esophageal bezoar in the distal esophagus. A. Distant view under electronic gastroscopy. B. Close-up view under electronic gastroscopy.

Figure 2. Chest CT examination revealed that the gastric tube was embedded with the esophageal bezoar at the level of the T2 vertebral body.

145 mmol/L, K^+ 2.9 mmol/L, Ca^+ 0.95 mmol/L, Glu 4.8 mmol/L, Lac 1.7 mmol/L, HCO_3 -24.3 mmol/L, BE -1.6 mmol/L, and P/F 107 mmHg. Additionally, APACHE II score was 28. Upon admission to the ICU, the patient continued to receive endotracheal intubation with assisted ventilation and was administered remifentanil and propofol for sedation and analgesia. The patient's nutrition risk screening (NRS) 2002 score was 5, with no contraindications for enteral nutrition. Enteral nutritional support administered by a nasogastric tube was initiated 26 hours after ICU admission. The traditional auscultation method was used to confirm the position of the nasogastric tube tip. Initially, small amounts of standard protein (SP) formula were used for trophic feeding, and the dosage was gradually increased over the following days to meet patient caloric requirements. Despite conventional nutritional therapy, the patient's limb muscle strength decreased from grade 3 to grade 1, primarily due to the multiple injuries and cervical spine injury. Additional treatments included cefoperazone-sulbactam, omeprazole, and fluid resuscitation.

On the seventh day post-admission, the patient's spontaneous breathing weakened, necessitating a tracheostomy to maintain respiratory function. On Day 13, the patient underwent posterior cervical spine fracture-dislocation open reduction and wire internal fixation + anterior cervical discectomy and decompression with interbody fusion and internal fixation. Postoperatively, the patient was transferred back to the ICU. Owing to the need for wound dressing changes on the patient's back and neck, lateral repositioning was required every 3-7 days. In anticipation of improved gastrointestinal function, nutritional support was adjusted to total protein formula (TPF), which was provided enterally. On Day 28 of enteral nutritional support, the patient gradually developed oral reflux of the enteral nutrition formula, with reflux also observed at the tracheostomy site. Multiple attempts to replace the gastric tube with a nasojejunal tube were unsuccessful. The endoscopy center subsequently assisted with placing a nasojejunal feeding tube. During the procedure, no obvious tracheoesophageal fistula was observed; however, many hard, milky concretions were found in the distal esophagus, suggesting the formation of an 'esophageal bezoar' (**Figure 1**). A chest CT revealed an obstruction of the nasogastric tube in the middle and lower esophagus, with suspected encapsulation (**Figure 2**). Endoscopic biopsy forceps were used to fragment the concretion, partially pushing it into the stomach. The residual lumen allowed successful placement of another nasogastric tube. Following endoscopy, the patient was temporarily nil per os (NPO), and physiologic saline was administered through the nasogastric tube to continue to soften the 'esophageal bezoar'. Ultimately, the patient experienced muscle strength loss, worsening respiratory dysfunction, and less stable circulation than at admission. The patient's prognosis was poor, and he finally requested to be discharged.

Discussion and conclusion

This case involved a patient with multiple injuries, resulting in high-level spinal cord injury, who developed a rare clinical presentation of esophageal bezoars due to obstruction of the distal esophagus by enteral nutrition. Although the progression of esophageal stone formation due to enteral nutrition in the esophagus was documented in the international literature as early as 1995 [1], further detailed descriptions regarding the etiology, pathogenesis, and potential complications (prognosis) associated with esophageal stones had not been provided [9]. The current case suggests a possible reason for the development of esophageal stones in clinical practice, alerting us to possible similar events in the future.

Enteral nutrition can be administered orally or by nasogastric tubes, nasoduodenal tubes, nasoenteric tubes, or gastroenterostomy tubes [3]. In clinical practice, blind insertion is commonly used for placing nasogastric tubes at depths of 55-60 cm. However, during blind insertion, it is possible for the front end of the tube to coil around the stomach fundus and for the proximal hole to be positioned near or even within the esophagus above the cardia. This allows enteral nutrition fluid to reflux into the esophagus and directly enter into the lumen, leading to the formation of esophageal bezoars [11]. In addition, the use of casein-containing enteral nutrition preparations alone is also a key factor in bezoar development. In the early stage, patients are treated with SP for enteral nutrition after hepatectomy and splenectomy, while in the late stage, patients are treated with whole protein enteral nutrition preparations containing casein. The occurrence of esophageal calculi may be due to the lack of pepsin and trypsin in the secreted gastric juice and reflux into the distal esophagus [12, 13]. Additional contributing factors may include the following: 1. Reduced muscular contraction and swallowing ability in response to sedative and analgesic medication use [14-16] and 2. Progressive deterioration of swallowing function due to impairment of the central nervous system [17]. Late in the course of disease, a chest CT may reveal pulmonary infection, which may be a result of aspiration [18].

This case report describes a patient with predominant spinal cord injury who underwent tracheostomy following multiple traumatic events. The high-level spinal cord injury likely resulted in abnormal contractions of the respiratory and gastrointestinal muscles, leading to compromised respiratory function and intestinal motility and impaired airway clearance [17]. Throughout his course of illness, external examinations were conducted, along with debridement procedures on the skin lesions on his back, which may have led to the displacement or bending of the gastric tube, causing a slow flow rate and leading to an accumulation of nutritional liquid between the distal part or cardia. This ultimately resulted in the formation of esophageal stones [19]. Following the formation of esophageal stones, the liquid enteral nutrition formula flowed back toward the epiglottis and then leaked out through the tracheotomy incision onto the wound and skin surface. During the decannulation process, refluxed liquid may have been aspirated into the lungs, increasing the risk of lung infection. Overall, the presence of esophageal stones indicates a poor prognosis. This case shows that for patients with high paraplegia, enteral nutrition formulas should be carefully selected, the position of the gastric tube insertion should be carefully monitored during treatment, and the effectiveness of treatment should be evaluated relatively frequently.

Disclosure of conflict of interest

None.

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