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【 CASE REPORT 】

Tannin-phytobezoars with Gastric Outlet Obstruction Treated by Dissolution with Administration and Endoscopic Injection of Coca-Cola®, Endoscopic Crushing, and Removal (with Video)

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Abstract:
A 77-year-old man complained of postmeal vomiting and sustained general fatigue. An abdominal computed tomography scan showed massive gastric expansion and fluid storage. Gastroscopy revealed four gastric bezoars that were considered to have caused pyloric ring obstruction. The patient was asked to drink 500 mL per day of Coca-Cola® for 4 days. On the fourth day, we performed endoscopic crushing and removal by injecting Coca-Cola®, cutting the softened bezoar with endoscopic snares, and collecting the pieces with endoscopic nets. We herein report (with a video presentation) a rare case of tannin-phytobezoars endoscopically removed with the administration and injection of Coca-Cola®.

Key words: gastric bezoars, tannin, phytobezoars, endoscopic surgery, Coca-Cola®, gastric outlet obstruction

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Introduction

Many previous reports have discussed various complications of gastric bezoar, including upper abdominal pain, gastrointestinal ulcers, perforation, ileus, and acute pancreatitis (1-5). Table shows the causes and risk factors of gastric bezoar (6, 7), classified as follows: phytobezoars, trichobezoars, lactobezoars, and pharmacobezoars (8). Several reports have treated gastric bezoars through endoscopy as the first step, with surgical treatment often performed for cases that are difficult to treat endoscopically. In particular, treating gastric tannin-phytobezoars, caused by the frequent consumption of persimmon, through Coca-Cola® dissolution therapy has often been considered first, as it is easy, safe, and cost-effective to perform (9, 10). However, there have been reports of Coca-Cola®-reduced bezoar causing small intestine obstruction, which resulted in ileus and acute pancreatitis (3, 4). Therefore, it is more reliable and safer to remove the bezoars directly with an endoscope before they migrate to the duodenum.

We herein report a case of gastric tannin-phytobezoar treated with dissolution by the administration and endoscopic injection of Coca-Cola®, endoscopic crushing, and removal. In addition, we provide a rare video presentation of the endoscopic treatment of gastric bezoar.

Case Report

A 77-year-old man presented to our hospital with postmeal vomiting and sustained general fatigue for 2 weeks. Abdominal computed tomography revealed massive gastric expansion and fluid storage, with four 3- to 6-cm occupational high-density lesions in the gastric fluid (Fig. 1). Gastroscopy was performed after gastric fluid drainage with a nasogastric tube and revealed four gastric bezoars (Fig. 2).

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Table. **Causes and Risk Factors of Gastric Bezoar (6, 7).**

Lifestyle habits	Habitual consumption of persimmons Extended-release drugs Insufficient dissolution of powdered milk Insufficient water intake Allotriophagy
Anatomical and functional disorders of the stomach	Delaying gastric emptying Post-gastric surgery Gastric diverticulum Hypo- and anacid

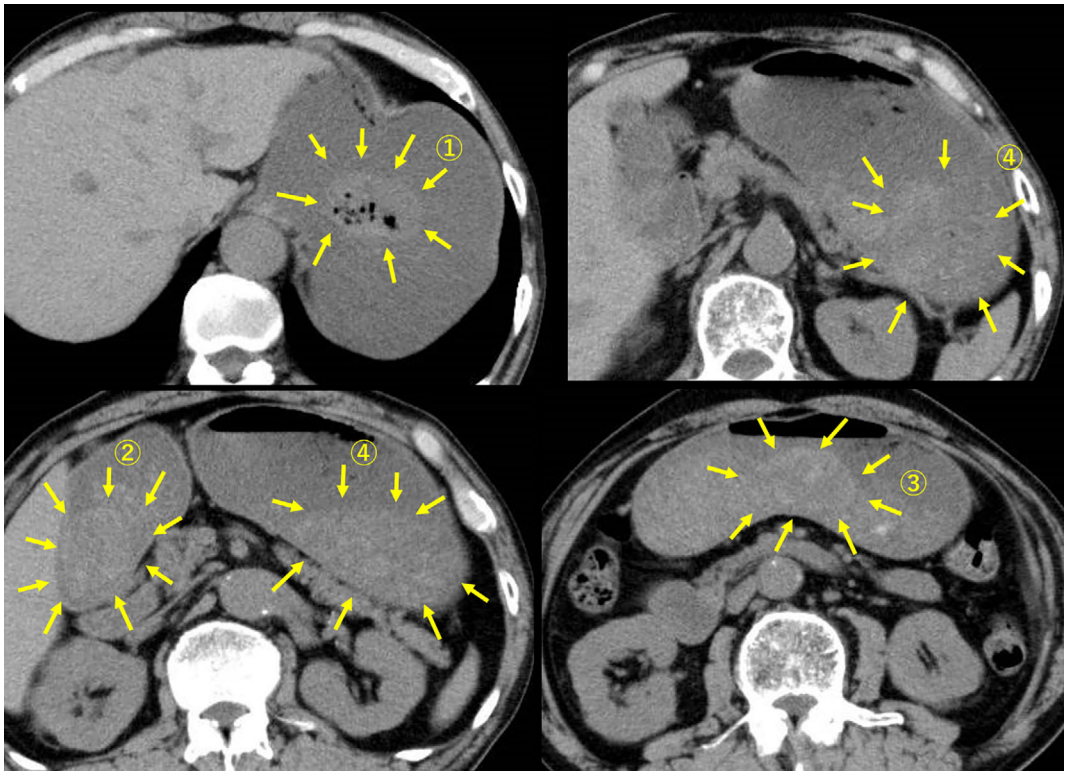

Figure 1. **Abdominal computed tomography findings. There was massive gastric expansion and fluid storage, with four 3- to 6-cm occupational high-density lesions noted in the gastric fluid (yellow arrows).**

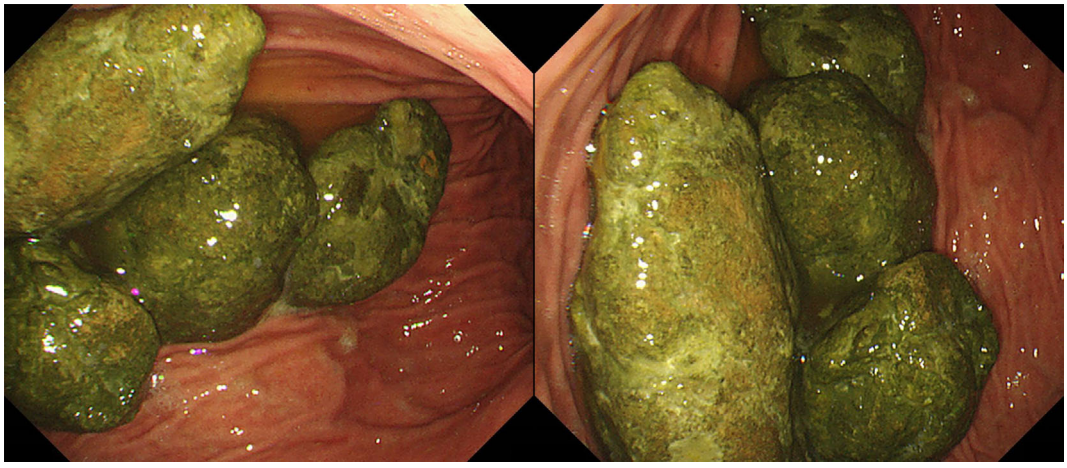

Figure 2. **Gastroscopy findings. There were four gastric bezoars with a hard surface that were not crushed by typical endoscopic biopsy forceps.**

Figure 3. **Successful removal of bezoars. A capsule endoscope is included in the lower right corner for size comparison.**

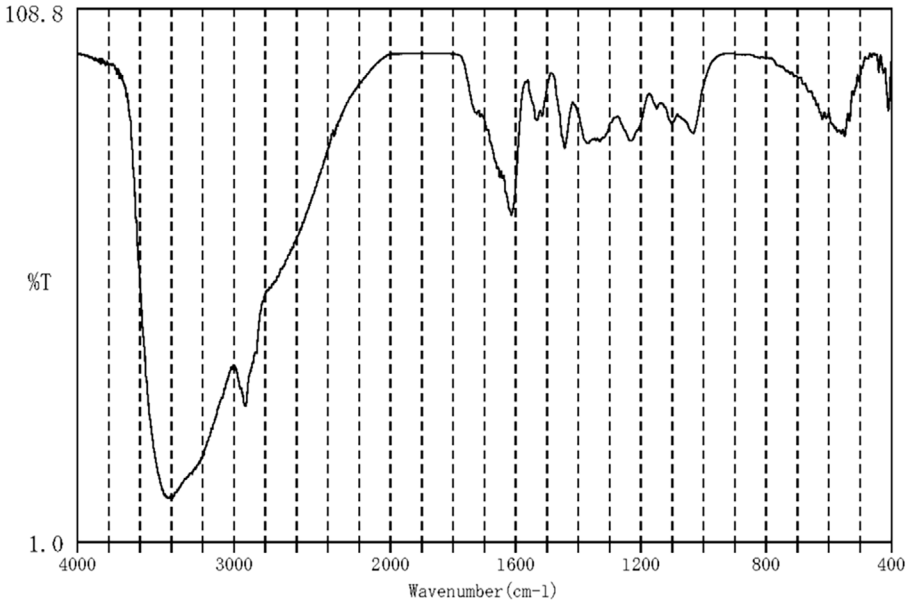

Figure 4. **A component analysis of the gastric bezoars by infrared absorption spectrometry revealed that over 98% of the constituents were tannins.**

There were no findings of other possible etiologies of pyloric obstruction. Therefore, we considered the patient's complaints to have been caused by pyloric ring obstruction due to gastric bezoars. When gastroscopy was performed, we found that the bezoars' surfaces were hard and could not be crushed using the standard endoscopic biopsy forceps.

When asked about his lifestyle to determine the possible cause of the gastric bezoars, we found that the patient owned a persimmon tree and consumed the fruit daily. There was no medical history of gastric surgery or diabetes mellitus. Furthermore, gastric diverticulum was not evident in gastroscopic findings. Therefore, we suspected that the bezoars had been formed due to the daily consumption of tannin from persimmons.

Because of the possibility of pyloric obstruction caused by gastric bezoars, there was a risk of vomiting if a large amount of Coca-Cola® was administered at once. Therefore, the patient was asked to drink 500 mL once per day of Coca-Cola® for 4 days. On the fourth day, we performed the endoscopic treatment (crushing and removal) through the following steps: 1) injecting about 10 to 20 mL of Coca-Cola® into a bezoar at a time by inserting a direct endoscopic injection needle into the surface of the bezoar, 2) cutting the softened bezoar with endoscopic snares (ϕ25 mm, SnareMaster, Olympus, Tokyo, Japan), and 3) collecting the specimen using endoscopic nets (Supplementary material 0:00-15:00). The above procedure was repeated until all bezoars had been completely removed. Of note, during the second step, seven snares were needed because the snares broke easily. After the procedure, there were no further symptoms.

The removed gastric bezoars were soft enough to be

crushed using our fingers (Fig. 3, Supplementary material 16:00-21:00). Furthermore, the component analysis revealed that over 98% of the constituents were tannins (Fig. 4).

Discussion

Tannin, found in the skin of unripe persimmons, reacts with hydrochloric acid in the stomach and forms a coagulum. Subsequently, a bezoar accumulates comprising cellulose, hemicellulose, and protein (9, 11). Ladas et al. recommended gastric bezoar treatment by gastric lavage with 3 liters of Coca-Cola® over 12 hours and additional endoscopic fragmentation to achieve complete dissolution (9, 10). However, we did not administer a large amount of Coca-Cola® in order to reduce the risk of vomiting secondary to pyloric obstruction and gastric bezoars. Yoshiyama et al. reported the Coca-Cola® injection method, which involves injecting Coca-Cola® directly into the bezoar. The reported advantages of this method were the small amount of Coca-Cola® used and the reduced total treatment time (12). We considered this method suitable for cases with gastrointestinal obstruction, as in the present case.

In this case, the snares we used are intended for general polypectomy, not for bezoar cutting. As a result, many snares were broken, although the Coca-Cola® softened the bezoars. Toka et al. reported the efficacy of "hand-made bezoaratome" that utilized a 0.25-mm-diameter guidewire, mechanical lithotripter sheath, and spinning wheel (3). Furthermore, Jinushi et al. reported the successful treatment of giant bezoars by sequential endoscopic treatment of electrohydraulic lithotripsy, alligator forceps, and snares (5). However, the commercialization of a device dedicated to gastric bezoars may be difficult due to the rarity of the disease.

Recent studies have reported that natural tannin extract supplementation might be effective for patients with coronavirus disease 2019 (13). Thus, if more people consume tannin in the future, gastric bezoar cases may increase. It is thus important to document similar cases and establish appropriate treatment strategies.

The authors state that they have no Conflict of Interest (COI).

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