

[ CASE REPORT ]

## Obstructive Bezoars of the Small Bowel Treated with Coca-Cola Zero through a Long Intestinal Tube and Endoscopic Manipulation

Kei Endo<sup>1</sup>, Keisuke Kakisaka<sup>1</sup>, Yuji Suzuki<sup>1</sup>, Takayuki Matsumoto<sup>2</sup> and Yasuhiro Takikawa<sup>1</sup>

### Abstract:

An 82-year-old Japanese man visited our hospital with abdominal fullness accompanied by lower abdominal pain. He presented with small bowel obstruction due to multiple diospyrobezoars. The bezoars were successfully removed without any surgical intervention by the administration of Coca-Cola Zero through a long intestinal tube and subsequent endoscopic manipulation. Such a combination may be the treatment of choice for small bowel obstruction due to bezoars.

**Key words:** multiple diospyrobezoars, small bowel obstruction, long intestinal tube, endoscopic manipulation, Coca-Cola Zero

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### Introduction

Diospyrobezoars are defined as masses of hard, indigestible material that form in the gastrointestinal tract. While most bezoars are asymptomatic and are incidentally found in the stomach, cases of small bowel obstruction due to bezoars have been reported, in which the bezoars were surgically removed (1). In contrast, there have been few descriptions of non-surgical treatment for small bowel bezoars (2, 3).

We herein report a case of small intestinal obstruction caused by multiple diospyrobezoars, which were successfully removed by the administration of Coca-Cola Zero through a long intestinal tube followed by endoscopic manipulation.

### Case Report

An 82-year-old Japanese man presented to our hospital with abdominal fullness accompanied by nausea, vomiting, and lower abdominal pain. These symptoms had progressed during the three previous days. He was unable to consume

either food or liquids during this period. He had been diagnosed with diabetes mellitus and was treated using glimepiride. However, the patient had no history of abdominal surgery.

A physical examination revealed abdominal distension and tenderness without a palpable mass or rebound tenderness. The laboratory data revealed inflammation and dehydration. Abdominal computed tomography (CT) revealed dilatation of the small intestine, and a bubbly mass impaction in the stomach and the proximal ileum (Fig. 1). Subsequent small bowel radiography through a long intestinal tube revealed multiple filling defects in the ileum, which ranged from 2-3 cm in size (Fig. 2). Detailed inquiries on his history revealed that he had been routinely ingesting a large number of persimmons every day. We therefore considered a diagnosis of diospyrobezoars resulting in small intestinal obstruction.

In consideration of his age and general condition, we first attempted to dissolve the bezoars with Coca-Cola Zero (Coca-Cola, Tokyo, Japan). He complained of abdominal distension; thus, after aspirating as much of the patient's bowel contents as possible, 500 mL of Coca-Cola Zero was administered through the intestinal tube. Two hours later, a

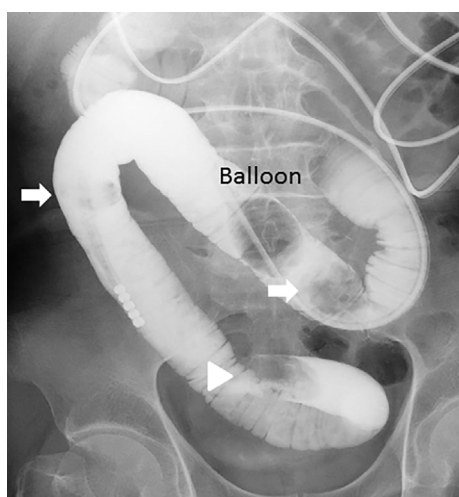
<sup>1</sup>Division of Hepatology, Department of Internal Medicine, Iwate Medical University, Japan and <sup>2</sup>Division of Gastroenterology, Department of Internal Medicine, Iwate Medical University, Japan

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Correspondence to Dr. Kei Endo, Keiindo@iwate-med.ac.jp



**Figure 1.** (A) Plain and (B) Enhanced (transverse section) computed tomography (CT) images reveal distension of the small intestine and multiple bubbly mass impaction within the stomach (arrow) and ileum (arrowheads).



**Figure 2.** Small bowel radiography through a long intestinal tube detected multiple filling defects (arrows) in the ileum. A bezoar of the most distal side was considered to have caused the obstruction (arrowhead) because the water-soluble contrast material did not flow beyond it.

certain volume of the administered liquid was aspirated. This procedure was repeated twice daily for three days. The patient's blood glucose level remained within the normal range. Subsequent small bowel radiography and abdominal CT revealed that the bezoars had moved to the terminal ileum (Fig. 3A). Furthermore, using colonoscopy, we were able to confirm that the green-to-brownish bezoars were impacting within the terminal ileum (Fig. 3B and C). Since the bezoars were not stiff, we disintegrated them using a polypectomy snare. This enabled us to extract the bezoars from the cecum (Fig. 3D). Consequently, four bezoars were successfully removed from the terminal ileum. After the procedure, the patient became asymptomatic without small intestinal dilatation.

Subsequent esophagogastroduodenoscopy (EGD) revealed

two firm bezoars remaining in the fornix to the upper gastric body and a gastric ulcer (Fig. 4A and B). We therefore instructed the patient to consume 1,000 mL/day of Coca-Cola Zero for three days. After four days, EGD revealed that the size of the bezoars remained unchanged. However, they had become friable, and we could easily disintegrate the bezoars using a polypectomy snare (Fig. 4C and D).

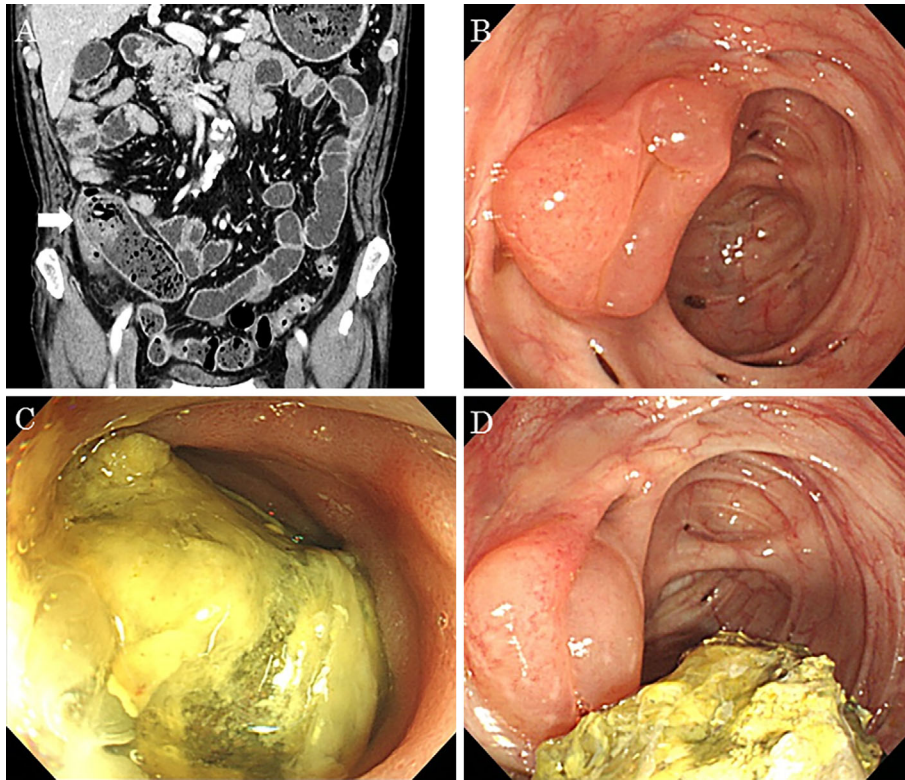
The analysis of the bezoars that had been removed from the stomach and terminal ileum by infrared absorption spectrometry showed that they were composed of tannin monomers, a component of persimmons, which confirmed our initial suspicion of diospyrobezoars.

## Discussion

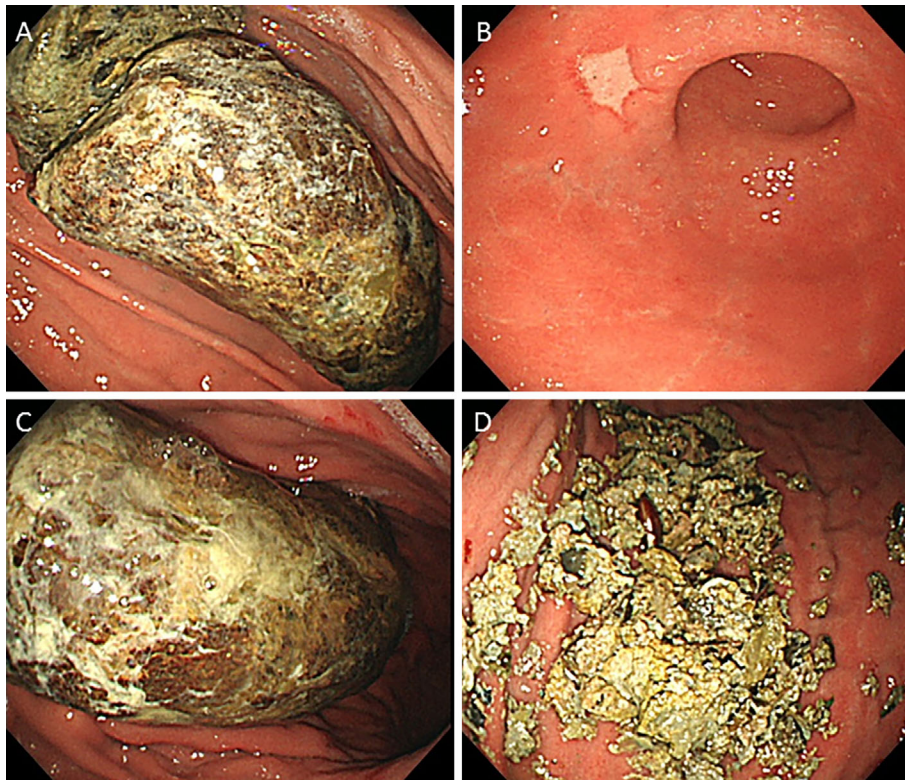
A diospyrobezoar is a specific type of phytobezoar that is caused by the excessive intake of persimmons and which is currently the most common type of bezoar in Asian countries (4, 5).

Diospyrobezoars are extremely hard; thus, it is difficult to fracture them endoscopically. In contrast, there have been some descriptions of the efficacy of Coca-Cola for the dissolution of bezoars (6, 7). Lee et al. (5) reported that Coca-Cola alone is not sufficient for complete dissolution of diospyrobezoars. However, the same investigators also mentioned that Coca-Cola could decrease the size and stiffness of diospyrobezoars. Since the solubility of diospyrobezoars in Coca-Cola Zero and Coca-Cola is reported to be similar (8), we used Coca-Cola Zero consideration of the patient's underlying diabetes mellitus (9). While a much larger volume of Coca-Cola is recommended for gastric bezoars (6), there are no reports describing the recommended volume for the treatment of small bowel obstruction. We chose to administer 500 mL through a long intestinal tube for two hours to avoid the development of abdominal pain and distension. The mechanism underlying the effect of dissolution therapy with Coca-Cola is still unknown. It has





**Figure 3.** (A) Computed tomography (CT) reveal that the bezoars had moved to the terminal ileum. (B) Colonoscopy revealing that the ileocecal valve had become edematous. (C) Green-to-brownish bezoars were impacted within the terminal ileum. (D) The bezoars were extracted to the cecum.



**Figure 4.** (A) Esophagogastroduodenoscopy revealing two green-to-brown bezoars at the fornix to the upper gastric body, (B) A gastric ulcer at the antrum, (C) After ingesting Coca-Cola Zero, (D) the bezoars disintegrated into small pieces.

been suggested that the NaHCO<sub>3</sub> present in Coca-Cola has a mucolytic effect. In addition, the fine CO<sub>2</sub> bubbles might permeate the microscopically uneven surface of the bezoars (8).

Although the components of the bezoars obtained from the terminal ileum and stomach were consistent, the firmness at the time of the initial treatment was different. In other words, the bezoars of the terminal ileum were soft, while those of the stomach were stiff. After the patient consumed Coca-Cola Zero, the bezoars of the stomach become friable. This change suggests that the bezoars of the small intestine also became friable. Consequently, the bezoars successfully moved to the terminal ileum. Colonoscopy revealed that the ileocecal valve had become edematous. We hypothesized that this was caused by an impacted bezoar, which resulted in a blood circulation disorder.

There have been few reports on the endoscopic treatment of small intestinal obstruction due to a single bezoar (2, 3). In contrast, it has been reported that surgical intervention is inevitable for the treatment of small intestinal obstruction with multiple bezoars (1, 10). Certainly, there have been cases of immobile small bowel bezoars with impaction, massive bleeding, or perforation. Thus, we believe that conservative treatment using Coca-Cola coupled with endoscopic manipulation may be an appropriate choice for treating cases of small bowel bezoars.

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

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