

Gastric Diospyrobezoar Dissolution with Ingestion of Diet Soda and Cellulase Enzyme Supplement

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ABSTRACT

Diospyrobezoars are a subtype of phytobezoars caused by excessive consumption of persimmons, which contain large amounts of tannins. In contrast to phytobezoars, diospyrobezoars have a harder consistency than other bezoars, making them more difficult to break up both chemically and endoscopically. We have previously reported successful dissolution of phytobezoars with diet soda and cellulase. A review of the literature found low efficacy of soda in dissolving diospyrobezoars compared to other phytobezoars. We report a case of successful dissolution of a diospyrobezoar after a failed attempt with diet soda alone.

INTRODUCTION

A bezoar is an amalgamation of ingested contents that are undigested and have formed a mass that is resistant to dissolution. Phytobezoars are bezoars composed of fruit and vegetable materials, while diospyrobezoars are a subtype caused by excessive consumption of persimmons, which contain large amounts of tannins.¹ In the presence of acid in the stomach, these persimmon tannins form a cellulose protein structure that can lead to the formation of a bezoar even in the absence of traditional risk factors that impair gastric motility or digestion such as gastric surgery, diabetes, mixed connective tissue disorders, and hypothyroidism.

Diospyrobezoars have a harder consistency than other bezoars, which makes them more difficult to break up both chemically and endoscopically. We have previously reported successful dissolution of phytobezoars with diet soda and cellulase.² A review of the literature found low efficacy of soda in dissolving diospyrobezoars compared to other phytobezoars.^{3,4}

CASE REPORT

A healthy 27-year-old male presented with 4 months of belching, foul breath, epigastric discomfort, reflux, and an exaggerated sensation of hunger. More than one year ago he started a vegan diet without any problems. Five months prior to the presentation, he began a seasonal food diet, largely consisting of persimmons (>10 per day). After one month on this diet, the patient noted the onset of the symptoms listed above. An upper endoscopy 3 months prior to presentation revealed a large bezoar and a small gastric ulcer (Figure 1). The bezoar was treated with discontinuation of persimmon consumption, resumption of his vegan diet, and one 12-oz can of soda 3 times per day. The patient selected diet soda based on personal preference. The ulcer was treated with omeprazole 40 mg once daily; however, due to the persistence of symptoms, he was switched to lansoprazole 30 mg daily. A repeat upper endoscopy 1 week prior to presentation showed resolution of the gastric ulcer but persistence of the bezoar.

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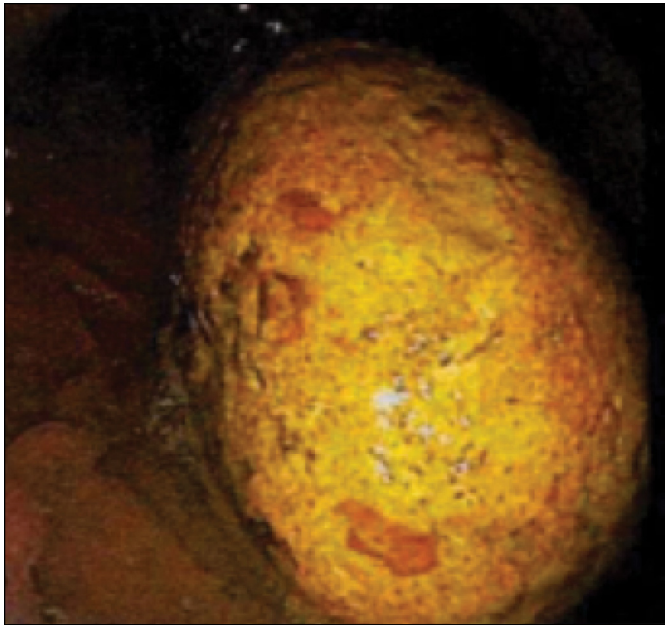


Figure 1. Initial endoscopy showing a phytobezoar in the stomach.



Figure 2. Upper gastrointestinal series without the bezoar.

When the patient presented to us for a second opinion, we instructed him to drink two 12-oz cans of diet soda per day, to take one capsule of a cellulase preparation containing 3,000 CU cellulase (Enzymedica Digest Gold) 2 times per day, and to discontinue lansoprazole. No other dietary restrictions were recommended. The patient completed 1 month of therapy in total and reported complete resolution of his symptoms while denying any adverse effects. An upper gastrointestinal series was normal without any evidence of residual bezoar or retained food (Figure 2).

DISCUSSION

Current treatments for bezoars include cellulase, papain, metoclopramide, *N*-acetylcysteine, endoscopic fragmentation, and surgical removal. The use of soda administration via nasogastric lavage, intrabezoar injection, or ingestion has been successful in several case series.^{4,5} This case differs because the patient likely had a diospyrobezoar, which is a specific type of bezoar that is formed as a consequence of a persimmon-rich diet. Persimmon tannins polymerize in an acidic environment to form a solid mass that results in a gastric diospyrobezoar.

The initial attempt to dissolve the bezoar with diet soda alone in the setting of gastric acid suppression lasted for 3 months and was unsuccessful. This finding is consistent with small observational studies that have evaluated the efficacy of soda in the dissolution of bezoars. One study found that ingestion of 3 L Coca-Cola resulted in complete phytobezoar

dissolution in 4 of 17 (23.5%) patients, while zero out of 11 patients with diospyrobezoars experienced success.¹

The mechanism of soda in dissolving bezoars has not been definitively elucidated, but some researchers have postulated that sodium bicarbonate found in soda acts as a mucolytic, while carbon dioxide bubbles penetrate between fibers of the bezoars, increasing the available surface area for reaction and digestion with acids from the stomach and from the soda.⁶ Perhaps tannin polymerization in acidic environments prevents acid alone from dissolving diospyrobezoars.

The addition of a cellulase dietary supplement, which also contains several other digestive enzymes (amylase, protease, glucoamylase, alpha galactosidase, lipase, lactase, glucanase, xylanase, pectinase, invertase, hemicellulase, maltase) and the cessation of acid suppression with a proton pump inhibitor resulted in the dissolution of the diospyrobezoar. Multiple simultaneous interventions (ie, diet soda, digestive enzymes, and discontinuation of acid suppression) obscure the individual contribution of each component of this regimen.

Cellulase may be important in the dissolution of a diospyrobezoar if the polymerized tannins trap vegetable matter and contribute to the overall bezoar matrix. Dissolving the incorporated vegetable matter may assist in the breakdown of the diospyrobezoar. Although acid is a critical factor in the formation of a diospyrobezoar, acid may also be necessary to assist the action of cellulase and diet soda in dissolution.

Other patients with diospyrobezoars presenting with obstruction require urgent endoscopic fragmentation for rapid resolution.⁷ In one case series, 10 patients were treated with endoscopic fragmentation using a polypectomy snare followed by the administration of cellulase, cysteine, and metoclopramide. Eight of the patients (80%) achieved resolution of their gastric outlet obstruction. The major drawback was the development in 2 patients (20%) of intestinal obstruction from fragments that passed through the pylorus.⁸

A regimen of diet soda and cellulase preparation given in the absence of acid suppression over 1 month may be an effective and safe means of treating difficult nonobstructing diospyrobezoars that do not dissolve with soda alone. Future studies evaluating this therapy for the dissolution of diospyrobezoars are needed to assess the overall efficacy of this regimen and reasons why it might be more effective than diet soda alone.

DISCLOSURES

Author contributions: J. Chun and M. Pochapin wrote the manuscript. J. Chun is the article guarantor.

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Informed consent was obtained for this case report.

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