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Closed perforation of the small bowel secondary to a phytobezoar: imaging findings

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ABSTRACT
Small bowel perforation secondary to phytobezoars is a rare clinical entity, which is not well-documented in the radiological literature. Sonographic and computed tomography (CT) findings of a case of closed small bowel perforation secondary to phytobezoars in a patient with previous gastric surgery are presented. Both abdominal ultrasound and CT examinations revealed a collection containing air at the left lower quadrant as well as neighboring intraluminal masses suggestive of bezoars. We propose that appropriate CT examination is a very useful imaging modality for evaluating this kind of bowel perforation.

Key words: • *intestinal perforation* • *ultrasonography* • *computed tomography*

Phytobezoars are conglomerates of poorly digested fruit and vegetable fibers that are found in the alimentary tract (1–3). They most often develop in patients who have undergone gastric resection or ulcer surgery. The most frequent clinical manifestation of phytobezoars is complete mechanical small bowel obstruction, frequently occurring in the jejunum or proximal ileum (4). It is known that phytobezoars can cause perforations and peritonitis due to pressure necrosis of the bowel wall (5); however, to the best our knowledge, this type of closed perforation secondary to phytobezoars has not been previously reported in the English language medical literature, which makes our presented case unique. The associated clinical signs and symptoms are non-specific and include abdominal cramping pain, vomiting, nausea, abdominal pain, fever, and an elevated leukocyte count (2, 6). As a result, definitive diagnosis of a small bowel obstruction or perforation caused by a phytobezoar is rarely established on clinical grounds; radiological studies are the mainstay of early diagnosis (2–4).

We present imaging findings of a closed small bowel perforation secondary to a phytobezoar, with a large interloop pouch showing continuity with the small bowel loops. The radiological findings of this type of perforation is not well-documented in the literature.

Case report

A 69-year-old man admitted to our hospital with abdominal pain that had begun 6 days earlier. The patient had undergone a Billroth II partial gastroenterostomy 11 years ago due to a gastric ulcer, refractory to medical treatment. The physical examination revealed left-sided tenderness without rebound pain. Bowel sounds were hypoactive. Laboratory data were unremarkable, except for a slightly elevated leukocyte count. Abdominal ultrasound (US) examination revealed a collection containing air at the left lower quadrant, and a neighboring mass with an arc-like hyperechoic surface and posterior shadowing (Fig. 1). Computed tomography (CT) was performed before and after oral contrast administration, which revealed a large pouch measuring approximately 17×10 cm (transverse × anteroposterior) filled with orally-administered contrast agent (Fig. 2a, b). The pouch demonstrated continuity with the jejunal loop. CT also revealed 2 well-defined, intraluminal, ovoid masses with mottled gas in close proximity to the defined pouch, which were suggestive of bezoars. Oral contrast material was noted surrounding the intraluminal bezoars (Fig. 2c, d). The parasagittal oblique reformatted CT images revealed the relationship between the bezoars and the pouch, confirming the area of perforation (Fig. 3). Barium series also revealed a large pouch at the level of the jejunum, which filled with contrast agent and formed air-fluid levels showing continuity with the distal jejunal segment. The patient could not eat or defecate because of this luminal continuation.

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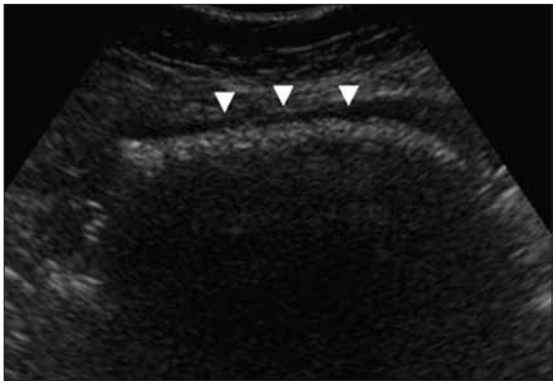

Figure 1. Sonographic examination reveals an echogenic area with a hyperechoic, arc-like surface *(arrowheads)* and clear posterior acoustic shadowing, located in close proximity to the area of collection.

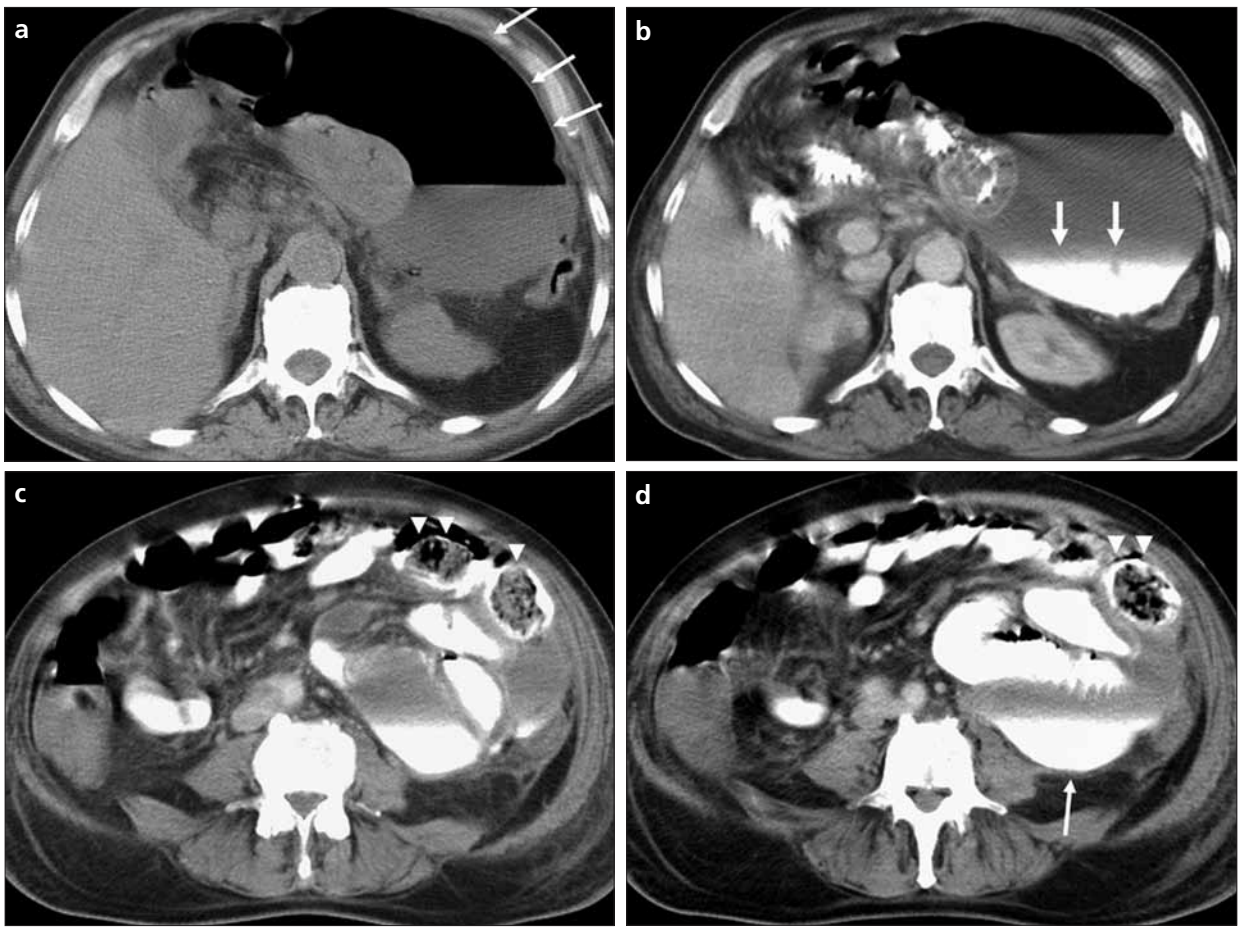

Figure 2. a-d. a. Unenhanced CT scan shows a large area of collection containing air-fluid level *(arrows)*. **b.** CT scan obtained after oral and IV contrast material administration reveals extravasation of contrast to the pouch, which is seen as a contrast-fluid level at this section *(arrows)*. **c.** Additionally, 2 ovoid intraluminal masses with a mottled gas pattern consistent with bezoars are demonstrated *(arrowheads)*. **d.** A consecutive CT section reveals that one of the phytobezoars *(arrowheads)* is located adjacent to the pouch, with contrast-fluid level *(arrow)* draining by a jejunal segment distally.

During surgical exploration, a phytobezoar, which caused a closed intestinal perforation at the distal jejunal segment and was communicating with a large pouch, as well as an additional smaller phytobezoar located proximally were observed. The phytobezoars were removed and primary repair was performed. There was no histopathological or surgical evidence of any pathology, such as Crohn's disease, small bowel tumor, or lymphoma, which might have caused the closed perforation of the bowel wall (7). An enterocutaneous fistula developed following surgery, which responded well to supportive medical therapy.

Discussion

Small bowel obstruction due to phytobezoar impaction is an uncommon clinical entity, which has become increasingly recognized since truncal vagotomy associated with drainage or gastric resection was introduced in the treatment of gastroduodenal peptic ulcers. A small bowel perforation secondary to a bezoar, on the other hand,

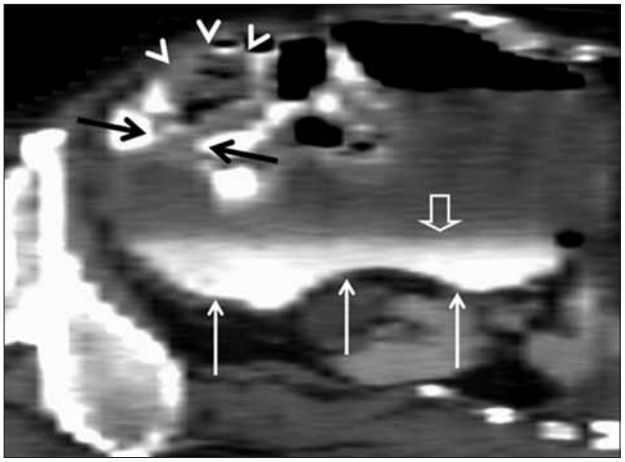

Figure 3. On a parasagittal oblique reformatted CT image, the bezoar formation *(arrowheads)* and the area of perforation *(black arrows)* are demonstrated. The large pouch is also revealed *(white arrows)* with the contrast-fluid level *(open white arrow)*.

is less frequently reported in the literature (3–10).

The mechanism by which phytobezoars are formed is through an alteration in gastric emptying due to decreased gastric motility caused by vagotomy and an enlarged gastric outlet caused by pyloroplasty or gastroenterostomy. Other factors predisposing to phytobezoar formation are poor mastication, excessive consumption of food with high fiber content, and diabetic gastroparesis (1–3, 9, 11).

Radiological studies for identifying bezoars include plain abdominal radiography, barium examinations, US, and CT. Plain abdominal radiography may reveal a mottled gas collection and dilated small bowel loops containing air/fluid levels if an obstruction is present. Barium studies are also reported to be useful in the detection of phytobezoars and in the diagnosis of complications. In barium studies, phytobezoars may be detected as an intraluminal filling defect of variable size that does not appear to be fixed to the bowel wall; however, it is difficult to differentiate these filling defects from intraluminal tumors (1, 3). Additionally, barium may interfere with other imaging modalities and may complicate surgery, even leading to peritonitis.

US or CT may be very effective in the preoperative diagnosis of bezoars and related complications. Sonographically, bezoars can be detected as an intraluminal mass with a hyperechoic, arc-like surface and prominent posterior acoustic shadowing. The appearance of bezoars may, however, be confused with other conditions, like gallstones, various calcifying masses, or calcified rim cysts (1, 2, 12). US also has difficulties in revealing multiple bezoars, probably because of the impossibility of exploring the entire course of the bowel loops. Moreover, air-fluid interfaces in obstructed dilated bowel loops or intraperitoneal air may obscure the underlying pathology. In the presented case, an echogenic area with a strong posterior shadowing, which was consistent with a phytobezoar containing gas, was observed. However, the other phytobezoar could not be visualized, probably because the air-fluid interfaces of the collection area obscured the lesion.

CT is reported to be a useful and powerful tool in the detection of small bowel phytobezoars because of its superior resolution. Characteristically, bezoars are observed as intraluminal masses with a mottled appearance, owing to the air retained in the interstices having a mottled pattern. Fluid or orally given contrast agent in the small bowel outlines the mass (9, 11–13). In addition to exact localization of the bezoar, CT can also demonstrate the existence of additional bezoars along the gastrointestinal tract, as well as associated complications, such as perforation and obstruction. CT can also provide differentiation between bezoars and other causes of an intraluminal mass, unlike US or barium studies (1–3). The characteristic appearance of bezoars may resemble that of small bowel feces described in cases of severe stasis in cystic fibrosis or high-grade small bowel obstruction. The small bowel feces sign has been defined as gas and particulate material within a dilated small bowel loop, which is normally devoid of luminal content. Small bowel feces may appear more amorphous and affect longer segments than a bezoar, which appears at the site of obstruction or perforation as a well-defined, focal, ovoid intraluminal mass with a mottled gas pattern (14, 15).

CT may be considered the imaging technique of choice for confirming the diagnosis of bezoars and their complications; however, it may not be sufficient for the evaluation of a closed perforation showing continuity with the small bowel loops. Upper gastrointestinal barium studies may be helpful in demonstrating the relationship of the pouch to the intestinal segments, as in our case. Inadequate appreciation of this clinical condition because of the non-specificity of its symptoms and signs may result in delayed diagnosis; therefore, radiologists must be aware of the radiological appearance of phytobezoars and the associated complications in cases involving previous gastric surgery or suggestive dietary history.

In this report, the radiological findings of an unusual case of a closed perforation with a large pouch, which developed secondary to a phytobezoar and showed continuity with the small bowel, were presented. In conclusion, we think that an appropriate CT examination is a very useful and time-efficient imaging modality for evaluating this kind of complex bowel perforation as it enables immediate and appropriate patient management.

References

1. Ko SF, Lee TY, Ng SH. Small bowel obstruction due to phytobezoar: CT diagnosis. Abdom Imaging 1997; 22:471–473.
2. Ko YT, Lim JH, Lee DH, et al. Small intestinal phytobezoar: sonographic detection. Abdom Imaging 1993; 18:271–273.
3. Verstandig AG, Klin B, Bloom RA, et al. Small bowel phytobezoar: detection with radiography. Radiology 1989; 172:705–707.
4. Hayes PG, Rotstein OD. Gastrointestinal phytobezoars: presentation and management. Can J Surg 1986; 29:419–420.
5. Ha HK,Kim JK. The gastrointestinal tract. In: Haaga JR, Lanzieri CF, Gilkeson RC, eds. CT and MR imaging of the whole body. 4th ed. St. Louis: Mosby, 2003; 1225.
6. Escamilla C, Roblos-Campos R, Parrilla-Paricio P, et al. Intestinal obstruction and bezoars. J Am Coll Surg 1994; 179:285–288.
7. Ipek T, Korman U, Kayabasi B, Eyuboglu E. Closed perforation of the small intestine showing continuity and the diagnostic role of enteroclysis. Hepatogastroenterology 1997; 44:161–163.

8. Burstein I, Steinberg. Small bowel obstruction and covered perforation in childhood caused by bizarre bezoars and foreign bodies. Isr Med Assoc J 2000; 2:129–131.
9. Quiroga S, Alvarez-Castells A, Sebastia MC, Pallisa E, Barluenga E. Small bowel obstruction secondary to bezoar: CT diagnosis. Abdom Imaging 1997; 22:315–317.
10. Yildirim T, Yildirim S, Barutcu O, Oguzkurt L, Noyan T. Small bowel obstruction due to phytobezoar: CT diagnosis. Eur Radiol 2002; 12:2659–2661.
11. Kim JH, Ha HK, Sohn MJ, et al. CT findings of phytobezoar associated with small bowel obstruction. Eur Radiol 2003; 13:299–304.
12. Zissin R, Osadchy A, Gutman V, Rathaus V, Shapiro-Feinberg M, Gayer G. CT findings in patients with small bowel obstruction due to phytobezoar. Emerg Radiol 2004; 10:197–200.
13. Ripollés T, García-Aguayo J, Martínez MJ, Gil P. Gastrointestinal bezoars: sonographic and CT characteristics. AJR Am J Roentgenol 2001; 177:65–69.
14. Lazarus DE, Slywotsky C, Bennett GL, Megibow AJ, Macari M. Frequency and relevance of the "small-bowel feces" sign on CT in patients with small-bowel obstruction. AJR Am J Roentgenol 2004; 183:1361–1366.
15. Fuchsjager MH. The small bowel feces sign. Radiology 2002; 225:378–379.