

# Ultrasonography evaluation of small bowel bezoars with suspicious findings on CT in the elderly

Tumay Bekci

Giresun University Faculty of Medicine, Department of Radiology, Giresun, Turkey

Copyright © 2019 by authors and Annals of Medical Research Publishing Inc.

## Abstract

**Aim:** Our aim was to evaluate the feasibility of using ultrasonography (US) in the detection and management of small bowel bezoars in elderly patients (> 65 y).

**Material and Methods:** This study included 15 elderly patients (> 65 y) with small bowel obstruction and initial diagnosis of small bowel bezoar using abdominal computed tomography (CT) from among 182 patients with small bowel obstruction. The diagnostic performance of US was prospectively evaluated and compared with the surgical or clinical diagnoses.

**Results:** Among the 15 patients, ten of them were diagnosed via ultrasonography as having small bowel bezoar. Eight patients were also surgically diagnosed with phytobezoars, and the remaining two patients who showed bezoars on US showed complete symptomatic improvement with ultrasonographic follow-up showing the bezoar passing through the cecum. The other five patients were surgically diagnosed with brid ileus. US correctly diagnosed small bowel bezoars in all patients. The sonographic follow-up of the bezoars in the two patients who showed symptomatic improvement was also successful.

**Conclusion:** US is a feasible imaging modality for the diagnosis and follow-up of small bowel bezoars. Timely diagnosis and management of bezoars is especially important in elderly patients. US can help both, radiologists and clinicians in easy diagnosis and timely management of small bowel bezoars in elderly patients.

**Keywords:** Bezoar; phytobezoar; ultrasonography; computed tomography; elderly.

## INTRODUCTION

Bezoar is a rare cause of small bowel obstruction and rarely subsides with conservative treatment; the treatment usually requires surgery (1). This is especially important for elderly patients with other diseases related with old age. Therefore, timely diagnosis and treatment of small bowel obstruction due to bezoars can reduce mortality among the elderly. Bezoars are divided into four main types: phytobezoars, trichobezoars, lactobezoars, and pharmacobezoars. Gastric bezoars usually cause ulceration and associated bleeding, while small bowel bezoars cause obstruction and ileus (2). Small bowel bezoars usually presents with a well-defined, feces-like intraluminal mottled gas-patterned material just proximal to the transitional zone and dilated proximal small bowel loops on computed tomography (CT) scans. However, other causes, such as adhesions that cause ileus, may show a similar CT appearance (1). Older age and surgical history are risk factors for both, adhesions and bezoars;

therefore, it is very challenging to clearly distinguish these two conditions using only CT.

Ultrasonography (US) is an imaging method that is initially performed for diagnosing abdominal diseases and reveals small bowel obstruction caused by a bezoar (3). The sonographic findings of small bowel bezoar include an intraluminal mass with an arc like surface and acoustic shadow (3,4). Twinkling artifacts on color Doppler imaging in bezoars have also been reported in the sonographic findings (3). In this study, we aimed to evaluate the role of US in the detection and management of small bowel bezoars in elderly patients with an initial diagnosis of small bowel obstruction and a suspicion of bezoar on abdominal CT. To the best of our knowledge, this is the first study evaluating the sonographic detection and management of small bowel bezoars in elderly patients.

## MATERIAL and METHODS

Our local ethics committee approved this study and written consent obtained from the patients.

**Received:** 27.04.2019 **Accepted:** 13.06.2019 **Available online:** 17.07.2019

**Corresponding Author:** Tumay Bekci, Giresun University Faculty of Medicine, Department of Radiology, Giresun, Turkey

**E-mail:** tmybkc@gmail.com

## Patients

Of the 182 patients with small bowel obstruction in the our hospital, ultrasonographic examination was prospectively performed for the 15 patients in whom the small bowel obstruction, detected using CT, was suspected to have been caused by a bezoar. The patients' medical records and surgery results were evaluated. Old age was defined as  $\geq 65$  y. All patients were  $> 65$  y old. Two patients had previously undergone subtotal gastrectomy, and three had previously undergone Roux-en-Y anastomosis.

## Image Analyses and Final Diagnosis

All CT examinations were performed using Siemens CT scanners (Somatom Definition, Siemens medical solution, Forchheim, Germany). After the initial CT scans, patients with small bowel obstruction suspected to be because of a bezoar, underwent US examination. The sonographic examinations were performed using the Toshiba Aplio XG SSA-790A (Toshiba Medical Systems Corporation, Otawara, Japan) equipped with a linear transducer (5-12 MHz) and a 3.5-MHz convex array transducer. The same radiologist who had seven years of experience performed all CT and US evaluations. US examination is based on CT findings. US examination was a focused examination on corresponding area of intestinal obstruction on CT images. The final diagnosis was based on surgical and pathological results or the clinical and sonographic follow-up of patients with spontaneous symptomatic improvement.

## Statistical Analysis

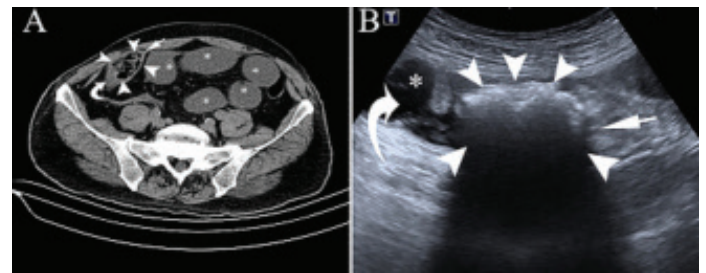
The Statistical Package for Social Sciences (SPSS), Version 22.0 (Chicago, IL, USA), was used for the statistical analysis. The descriptive data are presented as means  $\pm$  standard deviation and medians (minimum-maximum). The sensitivity, specificity, negative and positive predictive values for US examination was evaluated.

## RESULTS

Our study population included 15 patients, i.e., ten men and five women (10 men and 5 women; mean age: 70 y, 65–83 y). Dilated small bowel loops with mottled gas-patterned, feces-like material just proximal to the transitional zone and the absence of any evidence of wall thickening, suggesting a neoplasm were considered findings indicative of small bowel bezoar (Figure 1A). All US examinations were performed within 24 h of the initial CT scan. If patients with sonographically diagnosed small bowel bezoar showed symptomatic improvement, follow-up US examinations (range: 24–72 h) were also performed. An intraluminal mass with an arclike surface and a strong posterior acoustic shadow of the mass defined the sonographic criteria for the diagnosis of small bowel bezoar (Figure 1B). In ten patients, a bezoar was visible in the US examinations. Surgery was performed for eight of these ten patients. All patients with bezoars underwent

extraction via enterotomy as surgical intervention after US examination (Figure 2). Bezoars were found in the ileum in four, in the terminal ileum in four, and in the jejunum in two patients. All patients with surgically confirmed small bowel bezoars presented with phytobezoar. The other two patients, who showed symptomatic improvement before surgery, underwent follow-up US examination. US revealed that one of them had a bezoar in the cecum, and the other had a bezoar in the descending colon (Figure 3). After the follow-up US, small bowel obstruction regressed in these patients, and they recovered fully. The sensitivity, specificity, positive predictive value, negative predictive value, values for US in the diagnosis of small bowel bezoar was 1, 1, 1, and 1.

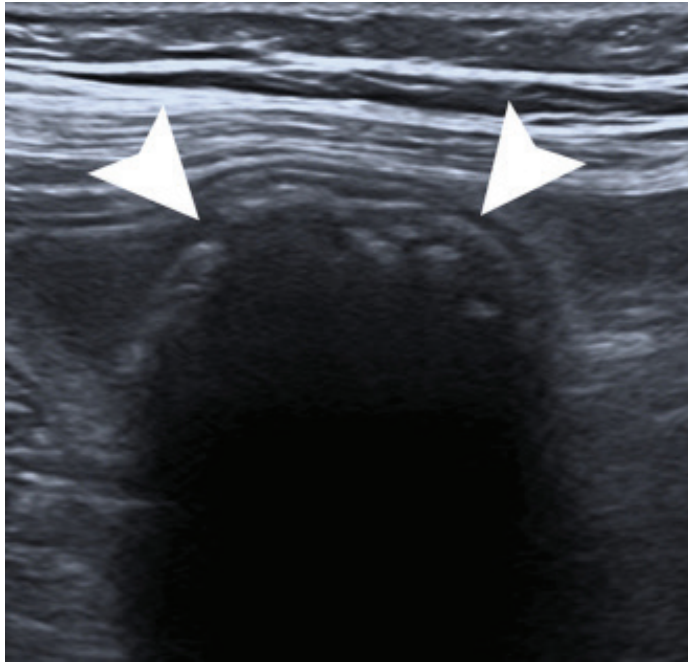
Five patients in whom US did not show a small bowel bezoar underwent subsequent surgery and were diagnosed with surgically confirmed brid ileus due to a previous surgery.



**Figure 1.** A 77-year-old man with bezoar-induced small bowel obstruction. **A.** CT shows a mottled gas-patterned intraluminal mass (arrowheads) suspicious of a bezoar just proximal to the translational zone of the ileum (curved arrow) with the dilated small bowel in front (asterisk). Obstruction ends after the bezoar (arrow). **B.** US shows an arc-like surfaced intraluminal mass (arrowheads) with a strong posterior acoustic shadow just proximal to the translational zone of the ileum (curved arrow) with the dilated small bowel in front (asterisk). Obstruction ends after the bezoar (arrow). The mass was confirmed as a phytobezoar after surgery.



**Figure 2.** Surgical demonstration of small bowel bezoar causing obstruction



**Figure 3.** Bezoar (asterisk) in descending colon in a 70-year old patient who showed symptomatic improvement in follow-up US examination

## DISCUSSION

Bezoars are formed by the accumulation of ingested foreign bodies in the gastrointestinal tract and are classified according to their contents (3). Trichobezoars and phytobezoars are the most common forms of bezoar (3). In our study, the cause of small bowel obstruction in all patients was phytobezoar. Phytobezoars are composed of poorly digested fruit and vegetable fibers. Risk factors for bezoar development include the history of gastric surgery, inadequate chewing, diabetes mellitus, and old age (1,3). Since our study involved elderly patients, all were at a high risk of developing bezoars. Vagotomy and partial gastrectomy decrease the gastric acid secretion and gastric motility, slowing the passage of fruit and vegetable fibers into the intestines and causing inadequate disintegration of food. Gastroenterostomy is also present in these patients, and there is an enlargement of the gastric outlet, leading to the passage of these materials through the small intestine without adequate disintegration, leading to obstruction in the small intestine. Five patients in our study had previously undergone surgeries, including subtotal gastrectomy and Roux-en-Y-anastomosis, increasing their risk of developing bezoars (5).

Small bowel obstruction is the most common clinical presentation of bezoars, although they are responsible for multiple intestinal obstructions (3). Small bowel obstruction induced by bezoars occurs in the narrow parts of the small intestine, and the distal ileum is the most common site (5). The intestinal lumen in this site is narrow; this slows the intestinal movements and motility due to the absorption of the bezoar water content in the proximal small intestine, making it the most common site for bezoar development (5). The jejunum is the second

most common site (5,6). Accordingly, bezoars were found in the ileum in four, in the terminal ileum in four, and in the jejunum in two patients in our study.

CT is the most commonly used imaging method for bezoar diagnosis (1,7). Small bowel bezoars usually present with a well-defined, feces-like intraluminal mottled gas-patterned material just proximal to the transitional zone and dilated proximal small bowel loops on CT scans. However, other causes, such as adhesions that cause ileus, may also show similar findings (1,8). Older age and surgical history are risk factors for both, adhesion and bezoar; therefore, making a clear distinction between these two conditions using only CT is difficult. Here, US has an essential role in the differential diagnosis. The use of US for detecting small bowel obstruction due to bezoar has been previously described in the literature (3). Sonographic findings of small bowel bezoar have been described as an intraluminal mass with an arc like surface and acoustic shadow (3,4). In our study, we used a two-step examination method. After the initial CT scan, we performed secondary US examination and follow-up US examinations for patients with bezoar-induced small bowel obstruction on CT examination. In our study, US revealed bezoars in ten patients. Surgery was performed in eight of these ten patients and confirmed the sonographic diagnosis. The other two patients who showed symptomatic improvement before surgery underwent follow-up US examination; one of them was found to have a bezoar in the cecum, and the other had a bezoar in the descending colon. After the follow-up US examination, small bowel obstruction regressed in these patients, and they recovered fully. This result showed us that US could be safely used for following up patients with bezoar-induced small bowel obstruction who show symptomatic improvement before surgery. Thereby, follow-up US examinations play a vital role, especially in elderly patients, in avoiding unnecessary surgical interventions. In addition, emergency physicians can use US in emergency department (ED) on the admission of the patients after CT scan immediately. Timely and affective use of ultrasound in ED can decrease mortality and morbidity in geriatric age group with small bowel obstruction due to a bezoar. To the best of our knowledge, this is the first study evaluating the sonographic detection and management of small bowel bezoars in elderly patients with the biggest patient group.

Our study has some limitations. First, although the patient group and elderly patient group were large, the number of cases studied was relatively small. Second, for the two patients who showed symptomatic improvement, the clinico-radiological diagnosis was not confirmed on a surgical and pathological basis.

## CONCLUSION

In conclusion, in the elderly, it is difficult to completely differentiate bezoar-induced small bowel obstruction from adhesive ileus, especially in patients with a history of gastrointestinal surgery. In this patient group, delayed diagnosis and treatment may increase the mortality and

morbidity. Therefore, the selection of an effective and appropriate imaging method is important for the timely diagnosis and treatment of small bowel obstruction due to a bezoar. US is an easily available, inexpensive, portable and radiation-free imaging method that plays a vital role in the diagnosis and follow-up of small bowel bezoars.

*Financial Disclosure: There are no financial supports*

*Ethical approval: This work has been approved by the Institutional Review Board.*

*Tumay Bekci ORCID: 0000-0002-3147-2786*

## REFERENCES

1. Lee KH, Han HY, Kim HJ, et al. Ultrasonographic differentiation of bezoar from feces in small bowel obstruction. *Ultrasonography* 2015; 34:211-6.
2. Iwamuro M, Okada H, Matsueda K, et al. Review of the diagnosis and management of gastrointestinal bezoars. *World J Gastrointest Endosc* 2015;7:336-45.
3. Kim HC, Yang DM, Kim SW, et al. Color Doppler Twinkling Artifacts in Small-Bowel Bezoars. *J Ultrasound Med* 2012;31:793-7.
4. Tennenhouse JE, Wilson SR. Sonographic detection of a small-bowel bezoar. *J Ultrasound Med* 1990;9:603-5.
5. Wang PY, Wang X, Zhang L, et al. Bezoar-induced small bowel obstruction: Clinical characteristics and diagnostic value of multi-slice spiral computed tomography. *World J Gastroenterol* 2015;21:9774-84.
6. Kuang LQ, Zhao DW, Cheng C, et al. Prediction of small bowel obstruction caused by bezoars using risk factor categories on multidetector computed tomographic findings. *BioMed research int* 2016;2016:6569103.
7. Nasri B, Calin M, Shah A, et al. A rare cause of small bowel obstruction due to bezoar in a virgin abdomen. *Int J Surgery Case Reports* 2016;19:144-6.
8. Mishra M, Sharma N, Rai V, Tripathi A, Keshri AK. An uncommon case of small bowel obstruction due to phytobezoar in a known case of tubercular abdomen: a decisional dilemma. *Int Surgery J* 2017;4:2868-70.