

# A Clinical Experience: Endoscopic and Surgical Management of Bezoars

## Klinik Bir Deneyim: Bezoarların Endoskopik ve Cerrahi Yönetimi

Server Sezgin Uludağ<sup>1</sup>, Deniz Esin Tekcan Şanlı<sup>2</sup>, Nazım Güreş<sup>3</sup>, Yusuf Ziya Erzin<sup>4</sup>,  
Abdullah Kağan Zengin<sup>1</sup>

<sup>1</sup>Istanbul University-Cerrahpaşa, Cerrahpaşa Faculty of Medicine, Department of General Surgery, İstanbul, Turkey

<sup>2</sup>Acıbadem Hospitals Group, Acıbadem Kozyatağı Hospital, Clinic of Radiology, İstanbul, Turkey

<sup>3</sup>Balıkesir Atatürk City Hospital, Clinic of General Surgery, Balıkesir, Turkey

<sup>4</sup>Istanbul University-Cerrahpaşa, Cerrahpaşa Faculty of Medicine, Department of Gastroenterology, İstanbul, Turkey

### Abstract

**Objective:** This study aims to evaluate the cases treated for gastrointestinal obstruction due to bezoar in terms of clinical-radiological-endoscopic features and treatment methods.

**Method:** Among the patients treated for acute mechanical intestinal obstruction (AMIO) in our hospital between January 2014 and December 2019, 33 patients with bezoar-related AMIO were included in the study. The cases were examined in terms of the presence of comorbidity, tomography and endoscopy features, and treatment modalities.

**Results:** A history of intraabdominal surgery was found in 82% of patients (n=27) and a history of upper gastrointestinal surgery in 60% (n=20). DM accompanied in 27% of the patients (n=9) and psychiatric disorder in 18% (n=6). With computered tomography, gastric dilatation was observed in 9 patients, jejunal in 9 patients, jejunoileal in 9 patients, and dilatation in all bowel segments in 6 patients. Endoscopy was performed in 12 patients; 9 had peptic ulcers, 3 were normal. Seventeen cases were treated with laparotomy, 9 cases with a laparoscopic enterotomy, and 3 cases with endoscopic procedures. 4 cases were treated with a Coca-Cola injection from a nasogastric catheter, which was successful.

**Conclusion:** It is difficult to diagnose bezoar-related AMIO with clinical findings. Radiological and endoscopic methods are important in diagnosis. Although endoscopic methods are also used successfully for therapeutic purposes, surgical methods are used in distal locations and complicated cases.

**Keywords:** Acute mechanical intestinal obstruction, bezoar, endoscopy, gastrointestinal surgery

### Öz

**Amaç:** Bu çalışmada bezoara bağlı gastrointestinal obstrüksiyon nedeniyle tedavi edilen olguların klinik-radyolojik-endoskopik özellikler ve tedavi yöntemleri açısından değerlendirilmesi amaçlanmıştır.

**Yöntem:** Ocak 2014-Aralık 2019 tarihleri arasında hastanemizde akut mekanik intestinal obstrüksiyon (AMİO) tedavisi gören hastalardan bezoar ilişkili AMİO'su olan 33 hasta çalışmaya dahil edildi. Olgular, komorbidite varlığı, tomografi ve endoskopi özellikleri ve tedavi modaliteleri açısından incelendi.

**Bulgular:** Hastaların %82'sinde (n=27) intraabdominal cerrahi öyküsü; %60'ında üst gastrointestinal cerrahi öyküsü vardı (n=20). DM hastaların %27'sine (n=9), psikiyatrik bozukluk hastaların %18'ine (n=6) eşlik etmekteydi. Bilgisayarlı tomografi ile 9 hastada mide dilatasyonu, 9 hastada jejunal, 9 hastada jejunoileal ve 6 hastada tüm bağırsak segmentlerinde dilatasyon görüldü. On iki hastaya endoskopi yapıldı; 9'unda peptik ülser vardı, 3'ü normaldi. On yedi olgu laparotomi, 9 olgu laparoskopik enterotomi ve 3 olgu endoskopik işlemlerle tedavi edildi. Dört olgu nazogastrik kateterden Coca-Cola enjeksiyonu ile tedavi edildi ve başarılı oldu.

**Sonuç:** Bezoar ilişkili AMİO'su klinik bulgularla teşhis etmek zordur. Tanıda radyolojik ve endoskopik yöntemler önemlidir. Endoskopik yöntemler de tedavi amaçlı olarak başarıyla kullanılsa da distal bölgelerde ve komplike olgularda cerrahi yöntemler kullanılmaktadır.

**Anahtar kelimeler:** Akut mekanik intestinal obstrüksiyon, bezoar, endoskopi, gastrointestinal cerrahi



**Address for Correspondence:** Server Sezgin Uludağ, İstanbul University-Cerrahpaşa, Cerrahpaşa Faculty of Medicine, Department of General Surgery, İstanbul, Turkey

**E-mail:** ssgn.uludag@gmail.com **ORCID:** orcid.org/0000-0002-0563-3769 **Received:** 27.01.2021 **Accepted:** 26.03.2021

**Cite this article as:** Uludağ SS, Tekcan Şanlı DE, Güreş N, Erzin YZ, Zengin AK. A Clinical Experience: Endoscopic and Surgical Management of Bezoars. Bagcilar Med Bull 2021;6(2):161-167

©Copyright 2021 by the Health Sciences University Turkey, Bagcilar Training and Research Hospital  
Bagcilar Medical Bulletin published by Galenos Publishing House.

## Introduction

Acute mechanical intestinal obstructions (AMIO) constitute 20% of all emergency abdominal surgical procedures (1). In all age groups, the most common cause of AMIO is adhesions secondary to abdominal surgery, although obstructions due to malignancy should be ruled out in older patients (2). Bezoars formed by the precipitation of non-digestible materials anywhere in the gastrointestinal tract (GIS) are among the rare causes of mechanical intestinal obstruction (0.4% to 4%) (3). They are named in different ways (phytobezoar, trichobezoar, pharmacobezoar, lactobezoar) according to the component they contain (4,5).

Conditions such as advanced age, DM, hypothyroidism, decreased GIS motility, feeding on fiber-poor food, dental or psychiatric disorders, not chewing food, vegetarian diet, dehydration, gastric emptying dysfunctions, and digestive difficulties. Methods such as partial gastrectomy, vagotomy, and gastric bypass in obesity surgery also increase the risk of developing bezoars (6,7). Although the symptoms vary depending on the content and localization, they can cause non-specific complaints such as epigastric tenderness, abdominal pain, and constipation. The most important complication is intestinal obstruction. In this case, patients usually apply to the emergency room with AMIO symptoms such as nausea-vomiting, and abdominal pain. The first imaging method to be used in the diagnosis is standing upright abdomen X-ray (8). Although it cannot be directly displayed with plain radiography, they may cause suspicion due to the calcification they contain and the air-liquid levels due to the AMIO they cause (9). Abdominal tomography (CT) is the most commonly used method for AMIO imaging in terms of showing the level, degree, and cause of obstruction (10). In the selection of the treatment modality, as bezoar provides information on localization, the degree of obstruction and dilatation is guiding in terms of operation indication and timing as it also shows complication findings such as accompanying intraabdominal air-fluid (11). Nevertheless, endoscopic methods continue to be the preferred method in the diagnosis of bezoar as it provides simultaneous treatment (12).

In this article, we discussed the series of 33 cases treated in our clinic in terms of clinical-radiological-endoscopic features and treatment methods due to bezoar, which is a rare entity in intestinal obstruction.

## Materials and Methods

Patients who were operated on or treated conservatively in our hospital between January 2014 and December 2019 were retrospectively reviewed. Thirty three cases with GIS obstruction due to bezoars were included in the study. The cases were evaluated in terms of demographic features, symptomatology, presence of comorbidity, and history of previous abdominal operation. All patients underwent standing upright abdominal X-ray and abdominal CT examination. Bezoar localization-count and additional findings were evaluated through CT. The patients were also evaluated in terms of radiological imaging and endoscopy findings, treatment methods, hospital stay, and morbidity/mortality rates.

### Statistical Analysis

Data were presented as mean  $\pm$  standard deviation (SD). As the overall number of cases was relatively small, no inferential statistical analysis was undertaken.

## Results

Patients diagnosed with AMIO between January 2014 and December 2019 were retrospectively screened. The etiology of 33 of 593 patients with AMIO was bezoar. The type in all of them was phytobezoar. The age range of the patients included in the study was 46-81 years (mean: 68 y). Twenty-three of the patients were male and 10 were female. The interval between the onset of symptoms and admission to the hospital ranged from 4 to 10 days (7.4 $\pm$ 2.0). Common symptoms in all patients were abdominal pain, nausea, and vomiting. 27% of patients had DM and 18% had psychiatric disorders.

History of intra-abdominal surgery was available in 82% of patients (27/33) (11 cases with peptic ulcer operation, 5 cases with Nissen fundoplication, 1 case with Heller myotomy for achalasia, 2 cases with obesity surgery, others with appendectomy, cholecystectomy, umbilical herniorrhaphy, primary raffia due to perforation) and 60% (20/33) had a history of upper GIS operation.

With CT, gastric dilatation was observed in 6 patients, jejunal in 14 patients, ileal in 7 patients, and dilatation in all small bowel segments in 8 patients. Bezoar could only be visualized in 2 patients (two patients with a gastric band in the stomach due to obesity surgery) (Figure 1). Intra-abdominal free fluid was detected in 2 patients and pathological intestinal wall thickening in 1 patient.

After CT, 12 patients underwent endoscopy. 9 had peptic ulcers; 3 of them were normal. Bezoars were seen and removed with endoscopy in 3 cases (Figure 2, 3).

Seventeen patients were treated with laparotomy (11 patients with gastrotomy and/or enterotomy, 4 patients with milking, 2 patients with segmental bowel resection), 9 patients with laparoscopic enterotomy, and 3 patients with endoscopic procedures. Pineapple juice was given to 3 patients after endoscopy. Four cases were treated with a carbonated drink with caffeine injection from a nasogastric catheter, which was successful.

The length of hospital stay of the patients ranged from 1 to 9 days (mean  $\pm$  SD: 5.2 $\pm$ 3.0). Thirty patients were discharged

without any problem. In one case, we removed the migrated gastric band and bezoar, anastomosis leak was detected on the post-op 5<sup>th</sup> day. The leak was treated with a conservative approach. In another patient who underwent laparoscopic enterotomy, intraabdominal infection developed. Intra-abdominal abscess was drained with the help of a percutaneous catheter. One patient developed lung infection. He was treated with antibiotics. Wound infection developed in only one patient. No mortality was detected in our series.

Details on comorbid diseases, previous abdominal surgeries, abdominal CT findings, procedures, and complications are shown in Table 1.

## Discussion

Previous gastric surgical operations prepare the ground for bezoar formation due to the hypomotility and hypoacidity they cause. In patients operated on for peptic ulcer, vagotomy accompanied by partial gastrectomy (antrectomy) has been identified as the most important risk factor for bezoar formation (13). Vagotomy decreases gastric acidity and interferes with chemical digestion; whereas, with antrectomy, mechanical digestion is negatively affected (14,15). In a study conducted by Kement et al. (14), it was reported that gastric surgery operations were the most common predisposing factor in bezoar formation with a high rate of 48%. According to Krausz et al.'s (15) and Bowden et al.'s (16) studies, these rates vary from 20% to 93%. In our series, the history of intra-abdominal operation was 82%, and the upper GIS operation history was 55%, which was in accordance with the literature. Consistent with the literature, 33% of these cases were operated due



**Figure 1.** Gastric band migrated into the stomach



**Figure 2.** Bezoar seen on endoscopy



**Figure 3.** View of fragmented bezoar

**Table 1. Preoperative characteristics of patients, treatment, and complications**

Case	GIS operation history	CT findings	Gastroscopy	Localization	Applied operation	Complication
1	-	Dilated small bowel segments	Normal	Jejunum	Carbonated drink with caffeine delivery to the nasogastric tube	None
2	Nissen fundoplication	Dilated stomach	Ulcer in the bulbous, reflux esophagitis	Duodenum	The bezoar without laparotomy-enterotomy was disintegrated by hand and distal to the ileocecal valve.	None
3	Umbilical hernia	Dilated ileal segments proximal to the middle ileum	Normal	Stomach and jejunum	Removal of bezoar by laparotomy-Gastrostomy and enterotomy	None
4	Cholecystectomy	Dilated jejunal segments	None	Jejunum	Laparotomy - bezoar without enterotomy was disrupted by hand and distal to the ileocecal valve	Lung infection
5	Peptic ulcer operation (Truncal Vagotomy + Billroth 2)	Intraabdominal free fluid, dilated small bowel segments	Gastritis	Ileum	Laparotomy- Removal of bezoar by enterotomy	None
6	Peptic ulcer operation (Truncal Vagotomy + Billroth 2)	Dilated ileal segments proximal to the middle ileum, intestinal wall thickness increase	Normal	Jejunum	Laparotomy- Removal of bezoar by small bowel resection	Wound infection
7	Primary therapy due to stomach perforation	Dilated jejunal segments	Healed ulcer scar in the bulbous	Jejunum	Laparotomy- Removal of bezoar by enterotomy	None
8	-	Dilated stomach	5 cm stomach bezoar, ulcer in a small curvature	Stomach	Endoscopic bezoar removal	None
9	Appendectomy	Dilated stomach	Pyloric stenosis healed ulcer area in the bulb, reflux esophagitis	Stomach	Endoscopic bezoar rupture	None
10	Nissen fundoplication and cholecystectomy	Dilated ileal segments proximal to the middle ileum	None	Distal ileum	Removal of bezoars by laparoscopic-assisted enterotomy	None
11	Gastric tape implantation due to obesity	Dilated jejunal segments bezoar and migrate gastric band in the small bowel	None	Stomach	Laparotomy - Removal of bezoar by gastrotomy, migrate gastric band removal by enterotomy	Leak on the 5 <sup>th</sup> day from the enterotomy line wound infection
12	Peptic ulcer operation (Truncal Vagotomy + Billroth 2)	Dilated ileal segments proximal to the middle ileum	None	Ileum	Laparotomy- Removal of bezoar by enterotomy	None
13	Peptic ulcer operation (Truncal Vagotomy + Billroth 2)	Dilated jejunal segments	None	Jejunum	Removal of bezoars by laparoscopic enterotomy	Intraabdominal abscess
14	Peptic ulcer operation (subtotal gastrectomy RNY gastrojejunostomy)	Dilated ileal segments proximal to the middle ileum	ulcer in the stomach fundus,	Ileum	Laparotomy - bezoar without enterotomy was disrupted by hand and distal to the ileocecal valve.	None
15	-	Dilated ileal segments proximal to the middle ileum	None	Stomach, ileum	Removal of bezoar by laparotomy-Gastrostomy and enterotomy	None
16	Appendectomy	Dilated small bowel segments	None	Ileum	Laparotomy - bezoar without enterotomy was disrupted by hand and distal to the ileocecal valve.	None

**Table 1. Continued**

Case	GIS operation history	CT findings	Gastroscopy	Localization	Applied operation	Complication
17	Heller myotomy-door fundoplication	Dilated jejunal segments	None	Jejunum	Removal of bezoars by laparoscopic enterotomy	None
18	Gastric tape implantation due to obesity	Dilated ileal segments proximal to the middle ileum	None	Ileum	Removal of bezoars by laparoscopic enterotomy	None
19	Peptic ulcer operation (Truncal Vagotomy + Billroth 2)	Dilated stomach	4 cm stomach bezoar, ulcer in a small curvature	Stomach	Endoscopic bezoar rupture	None
20	Peptic ulcer operation (Truncal Vagotomy + Billroth 2)	Dilated jejunal segments	None	Jejunum	Removal of bezoars by laparoscopic enterotomy	None
21	Peptic ulcer operation (Truncal Vagotomy + Gastrojejunostomy-Brown anastomosis)	Dilated jejunal segments	Ulcer in the bulbous	Jejunum	Removal of bezoars by laparoscopic-assisted enterotomy	None
22	Peptic ulcer operation (subtotal gastrectomy RNY gastrojejunostomy)	Dilated small bowel segments	Ulcer in the bulbous, reflux esophagitis	Ileum	Laparotomy- Removal of bezoar by enterotomy	None
23	Nissen fundoplication	Dilated jejunal segments	Recurrent hiatal hernia, reflux esophagitis	Jejunum	Removal of bezoars by laparoscopic enterotomy	None
24	Umbilical hernia	Dilated small bowel segments	None	Ileum	Carbonated drink with caffeine delivery to the nasogastric tube	None
25	Appendectomy	Dilated stomach and jejunal segments	None	Jejunum	Laparotomy- Removal of bezoar by enterotomy	None
26	-	Dilated jejunal segments	None	Jejunum	Laparotomy- Removal of bezoar by enterotomy	None
27	Nissen fundoplication	Dilated jejunal segments	Ulcer in the bulbous	Jejunum	Removal of bezoars by laparoscopic enterotomy	None
28	Peptic ulcer operation (Truncal Vagotomy + Billroth 2)	Dilated jejunal segments	None	Jejunum	Removal of bezoars by laparoscopic-assisted enterotomy	None
29	Appendectomy	Dilated jejunal segments	None	Jejunum	Laparotomy- Removal of bezoar by enterotomy	None
30	Nissen fundoplication	Dilated small bowel segments	Ulcer in the bulbous	Ileum	Carbonated drink with caffeine delivery to the nasogastric tube	None
31	-	Dilated stomach and jejunal segments	None	Jejunum	Laparotomy- Removal of bezoar by enterotomy	None
32	-	Dilated small bowel segments	None	Ileum	Carbonated drink with caffeine delivery to the nasogastric tube	None
33	Peptic ulcer operation (Truncal Vagotomy + Billroth 2)	Intraabdominal free fluid, dilated small bowel segments	None	Ileum	Laparotomy- Removal of bezoar by enterotomy	None

to peptic ulcers. Thanks to the proton pump inhibitors commonly used in the treatment of peptic ulcers, these rates are significantly reduced. On the other hand, with the proliferation of obesity surgery, the increase in gastric band, sleeve gastrectomy or gastric bypass operation rates also leads to an increase in the incidence of bezoar, since

it affects both mechanical and chemical digestion (6,7). In our study, two patients had gastric band operation due to obesity and the bezoar was localized to the small bowel.

One of the most important medical conditions affecting intestinal motility is diabetes. Diabetic gastroparesis

develops with the neuropathy caused by many years and GIS motility in these cases slows down significantly and prepares the ground for bezoar formation. In literature studies, the relationship between diabetes and bezoar has been well defined (13,17,18). In our series, diabetes rate was found to be associated with the development of bezoars at a high rate of 27%. Apart from this, psychiatric diseases have been reported among frequent etiologies due to both changes in eating habits and anticholinergic drugs used in treatment slowing the GIS motility (19,20). In our series, psychiatric disorders accompanied in 17% of our cases, which is compatible with the literature.

Pyloroplasty performed in peptic ulcer surgery generally accelerates the migration of bezoars into the small intestine (13,14). However, it can also occur primarily in conditions such as stricture, diverticulum, and tumor that affect the mechanical passage of the small intestine (14,21). Additionally, previous intra-abdominal surgical operations create bridging AMIO and a tendency to intestinal bezoar development. They almost always present with the symptoms of intestinal obstruction. The majority of the intestinal bezoars are located in the distal-terminal ileum, 50-75 cm of the ileocecal valve, the narrowest segment of the small intestine (22). In our cases, the rate of intestinal bezoars was higher than gastric bezoars and 80% of these cases had a history of GIS operation (82% intraabdominal-60% upper GIS). However, contrary to expectations, only 25% of intestinal bezoars were located in the distal ileum (13). We think that this is due to the fact that adhesions developing secondary to previous intraabdominal operations lead to more proximal obstruction.

The treatment of bezoars varies according to localization, size, the degree of AMIO caused, and complications. Chemical solvents such as carbonated drink with caffeine, cellulose, acetylcysteine, and endoscopic approaches and conservative methods are preferred in the treatment of bezoars located in the gastric and proximal intestine (23). Endoscopic methods are generally the preferred methods since they provide simultaneous diagnosis and treatment (13). In the treatment of gastric bezoar, lavage or dissolution, fragmentation, and/or retrieval are successful methods that can be applied endoscopically. In cases unresponsive to these procedures, open or laparoscopic surgical treatments can be applied in large-sized or distally located bezoars, and complicated AMIO (14). The most common method applied surgically is the manual fragmentation of the bezoar and milking method towards the cecum (1,2,22). In case of failure, bezoar should be removed by enterotomy. In

the presence of gangrenous intestine, segmental resection-anastomosis can be performed (1,2). In our series, 12 patients underwent endoscopic intervention, but only 3 of them were localized to the stomach endoscopically. In other cases, endoscopy was inadequate due to distal location, and a surgical operation was needed.

During surgery, the presence of accompanying bezoars in different localizations should be investigated because in one-third of the cases, there are multiple bezoars (23). Laparoscopy is preferred more than open procedures because of the shorter length of hospital stay and its being more comfortable for patients, but it requires experience for the manipulation of dilated and fragile segments. Radiological follow-up of the cases is also required after treatment, as it may lead to secondary complications (24-26). Recurrence rates are very low as long as the underlying factors are regulated by appropriate prophylactic medications that increase motility (1).

## Conclusion

Bezoars should be kept in mind in the differential diagnosis of AMIO, especially in the case of concomitant diabetes or previous intraabdominal surgery. In its treatment, firstly, medical and conservative methods should be tried, and surgical options should be used in cases of obvious AMIO and complications.

## Ethics

**Ethics Committee Approval:** The study protocol was approved by local ethics committee (date: 07.01.2021 no: 2575).

**Informed Consent:** Patients were not required to give their informed consent for inclusion in this retrospective study because we used anonymous clinical data and individual could not be identified according to the data present.

**Peer-review:** Internally peer-reviewed.

## Authorship Contributions

Concept: S.S.U., N.G., A.K.Z., Y.Z.E., Design: S.S.U., N.G., A.K.Z., Y.Z.E., Data Collection or Processing: D.E.T.Ş., S.S.U., Analysis or Interpretation: S.S.U., D.E.T.Ş., Writing: S.S.U., D.E.T.Ş., A.K.Z., Y.Z.E., N.G.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study has received no financial support.

## References

1. Brüggmann D, Tchartchian G, Wallwiener M, Münstedt K, Tinneberg H-R, Hackenthal A. Intra-abdominal adhesions: definition, origin, significance in surgical practice, and treatment options. *Dtsch Arztebl Int* 2010;107(44):769-775.
2. Athreya S, Moss J, Urquhart G, Downie A, Poon FW. Colorectal stenting for colonic obstruction: the indications, complications, effectiveness and outcome-5 year review. *Eur J Radiol* 2006;60(1):91-94.
3. Mohseni M, Kruse B. An unusual mimic of intermittent bowel obstruction. *Am J Case Rep* 2019;20:1920-1922.
4. Andrus CH, Ponsky JL. Bezoars: classification, pathophysiology, and treatment. *Am J Gastroenterol* 1988;83(5):476-478.
5. Kodadek LM, Makary MA. Small bowel obstruction In: Cameron J, Cameron A, (editors). *Current surgical therapy*. Philadelphia, PA: Elsevier Saunders; 2014:109-113.
6. Chen HW, Chu HC. Migration of gastric bezoars leading to secondary acute mechanical intestinal obstruction. *Intern Med* 2011;50(18):1993-1995.
7. Hewitt AN, Levine MS, Rubesin SE, Laufer I. Gastric bezoars: reassessment of clinical and radiographic findings in 19 patients. *Br J Radiol* 2009;82(983):901-907.
8. Eng K, Kay M. Gastrointestinal bezoars: history and current treatment paradigms. *Gastroenterol Hepatol (N Y)* 2012;8(11):776-778.
9. Delabrousse E, Lubrano J, Saille N, Aubry S, Manton GA, Kastler BA. Small-bowel bezoar versus small-bowel feces: CT evaluation. *AJR Am J Roentgenol* 2008;191(5):1465-1468.
10. Nasri B, Calin M, Shah A, Gilchrist B. A rare cause of small bowel obstruction due to bezoar in a virgin abdomen. *Int J Surg Case Rep* 2016;19:144-146.
11. Zissin R, Osadchy A, Gutman V, Rathaus V, ShapiroFeinberg M, Gayer G. CT findings in patients with small bowel obstruction due to phytobezoar. *Emerg Radiol* 2004;10:197-200.
12. Wang YG, Seitz U, Li ZL, Soehendra N, Qiao A. Endoscopic management of huge bezoars. *Endoscopy* 1998;30(4):371-374.
13. Dikicier E, Altintoprak F, Ozkan OV, Orhan Yagmurkaya I, Mustafa Yener Uzunoglu MY. Intestinal obstruction due to phytobezoars: An update. *World J Clin Cases* 2015;3(8):721-726.
14. Kement M, Ozlem N, Colak E, Kesmer S, Gezen C, Vural S. Synergistic effect of multiple predisposing risk factors on the development of bezoars. *World J Gastroenterol* 2012;18(9):960-964.
15. Krausz MM, Moriel EZ, Ayalon A, Pode D, Durst AL. Surgical aspects of gastrointestinal persimmon phytobezoar treatment. *Am J Surg* 1986;152(5):526-530.
16. Bowden TA, Hooks VH, Mansberger AR. The stomach after surgery. An endoscopic perspective. *Ann Surg* 1983;197(6):637-644.
17. Camilleri M. Clinical practice. Diabetic gastroparesis. *N Engl J Med* 2007;356(8):820-829.
18. Ahn YH, Maturu P, Steinheber FU, Goldman JM. Association of diabetes mellitus with gastric bezoar formation. *Arch Intern Med* 1987;147(3):527-528.
19. Andrus CH, Ponsky JL. Bezoars: classification, pathophysiology, and treatment. *Am J Gastroenterol* 1988;83(5):476-478
20. Altintoprak F. Gastric outlet syndrome associated with a recurrent trichobezoar: report of a case. *Turk J Gastroenterol* 2010;21(4):471-472.
21. Saeed ZA, Rabassa AA, Anand BS. An endoscopic method for removal of duodenal phytobezoars. *Gastrointest Endosc* 1995;41(1):74-76.
22. Lo CY, Lau PW. Small bowel phytobezoars: an uncommon cause of small bowel obstruction. *Aust N Z J Surg* 1994;64(3):187-189.
23. Acar T, Tuncal S, Aydin R. An unusual cause of gastrointestinal obstruction: bezoar. *N Z Med J* 2003;116(1173):U422.
24. Delabrousse E, Brunelle S, Saguet O, Destrumelle N, Landecy G, Kastler B. Small bowel obstruction secondary to phytobezoar CT findings. *Clin Imaging* 2001;25(1):44-46.
25. Kim JH, Ha HK, Sohn MJ, Kim AY, Kim TK, Kim PN, et al. CT findings of phytobezoar associated with small bowel obstruction. *Eur Radiol* 2003;13(2):299-304.
26. Altintoprak F, Gemici E, Yildiz YA, Uzunoglu MY, Kivilcim T. Intestinal obstruction due to bezoar in elderly patients: risk factors and treatment results. *Emerg Med Int* 2019;2019:3647356.