Bezoar in upper gastrointestinal endoscopy: A single center experience

Volkan Gökbulut[1], Mustafa Kaplan[2], Sabite Kaçar[1], Meral Akdoğan Kayhan[1], Orhan Coşkun[1], Ertuğrul Kayaçetin[1]

[1]Department of Gastroenterology, Yüksek İhtisas Training and Research Hospital, Ankara, Turkey
[2]Department of Gastroenterology, Ahi Evran University Training and Research Hospital, Kırşehir, Turkey

Cite this article as: Gökbulut V, Kaplan M, Kaçar S, Akdoğan Kayhan M, Coşkun O, Kayaçetin E. Bezoar in upper gastrointestinal endoscopy: A single center experience. Turk J Gastroenterol 2020; 31(2): 85-90.

ABSTRACT

Background/Aims: We aimed to investigate the association of bezoar with endoscopic findings, risk factors for bezoar occurrence, and the success of endoscopic treatment in a tertiary center.

Materials and Methods: This retrospective study was conducted between January 2012 and December 2015. Overall, 8200 endoscopy records were examined and 66 patients with bezoar were included in the study.

Results: We enrolled 29 (44%) female and 37 (56%) male patients in this study. The mean age of the patients was 63±9.4 years. The most frequent risk factors were history of gastrointestinal surgery (23%), diabetes mellitus (17%), trichophagia (9%), and anxiety disorder (6%). Gastric ulcer, duodenal ulcer, erosive gastritis, and reflux esophagitis were present in 27%, 11%, 20%, and 23% of the patients, respectively. While bezoars were most commonly observed in the stomach (70%), the majority of them were phytobezoars (91%). The mean number of interventions for each patient was 1.5 (range, 1-6). Endoscopy was successful in removing bezoars in 86.5% of the patients. Among those referred to surgery, seven patients underwent gastrostomy (10.5%); one (1.5%) patient underwent gastroenterostomy because of concomitant pyloric stenosis; and one (1.5%) patient underwent fistula repair surgery due to the development of duodenal fistula caused by bezoar.

Conclusion: The findings of this study indicated that bezoars are more common among subjects with history of gastrointestinal surgery, diabetes mellitus, or psychiatric disorders; bezoars are closely related to peptic ulcer and reflux esophagitis; and they can be successfully treated with endoscopy.

Keywords: Phytobezoar, trichobezoar, reflux esophagitis

INTRODUCTION

Bezoars are mass lesions of the gastrointestinal tract, which are composed of substances such as undigested food, medication, and hair (1). They are most commonly observed in the stomach, although they may also involve the esophagus, duodenum, and other segments of the bowel (2). Whereas the majority of the patients are asymptomatic, some patients may present with pain, early satiety, weight loss, and bloating (3). Esophageal bezoars generally present with dysphagia, retrosternal pain, and gastroesophageal reflux (4). Bezoars have clinical importance because they may be associated with complications such as bleeding, intestinal obstruction, perforation, and fistulization to adjacent organs or skin (5-8). Four basic types of bezoars have been defined: phytobezoar, trichobezoar, pharmacobezoar, and lactobezoar (9).

Various risk factors for the occurrence of bezoars have been identified (10). History of gastrointestinal surgery (11), chronic diseases affecting motility such as diabetes mellitus (12), and psychiatric disorders, especially trichophagia (13), are among the well-established risk factors. The initial treatment includes elimination of the causative factor and utilization of substances such as cola and pineapple juice, which can facilitate the digestion of bezoars (14). However, endoscopic procedures are generally required for both diagnosis and treatment. It is possible to treat most bezoars by means of repeated endoscopic treatment sessions (15). Nevertheless, surgical treatment may be required for cases in whom endoscopic treatment fails (16).

There are several studies in the literature regarding rare types of bezoars (17, 18), complications of bezoar (19),

This study was presented at the 3rd International Conference of Euroasian Gastroenterological Association Congress, 10-14 October 2018, Antalya, Turkey.

Corresponding Author: **Mustafa Kaplan; mustafakaplandr@yahoo.com**
Received: **February 1, 2019** *Accepted:* **March 22, 2019**

DOI: **10.5152/tjg.2020.18890**

and surgical treatment options (20). There are few studies about endoscopic treatment of bezoars, success rate of endoscopic treatment, accompanying endoscopic findings, and the association of bezoars with gastrointestinal bleeding, esophagitis, and peptic ulcer.

This study was conducted in a tertiary center. We investigated the association of bezoar with endoscopic findings, the risk factors for the occurrence of bezoar, and the success of endoscopic treatment in patients who were detected to have bezoar on upper gastrointestinal endoscopy.

MATERIALS AND METHODS

This retrospective study was conducted by examining the files of patients who underwent upper gastrointestinal endoscopy in our gastroenterology clinic between January 2012 and December 2015. The patients in whom bezoar was detected on endoscopic examination were enrolled in the study. Overall, 8200 endoscopy records were examined and 74 patients with bezoar were detected. Eight of these patients were excluded from the study because of lack of clinical data, and the remaining 66 patients were included in this study.

Using the patients' medical records, we documented and recorded the demographic characteristics; risk factors; number of endoscopic sessions; and location, type, and size of bezoars for each patient. We used the Los Angeles classification to assess patients with reflux esophagitis (21). Mass lesions formed of undigested food remnants were defined as phytobezoar, while those composed of hair were defined as trichobezoar. Endoscopic procedures were performed by experienced endoscopists using a single-channel endoscope (GIF-H260 or GIF-Q260, Olympus Optical Co., Ltd., Tokyo, Japan). Polypectomy snare, mouse-tooth forceps, tripod, basket, and/or mechanical lithotripsy equipment and overtube were used to fragment the bezoars. As necessary, 500 mL/day of pineapple juice was administered to the patients, and this procedure was repeated before the sessions in resistant cases. Success in endoscopic treatment was defined as complete fragmentation and/or extraction of bezoars using this intervention. The patients with treatment failure or complications were referred to surgery.

Statistical analysis

Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) for Windows 20 (IBM Corp.; Armonk, NY, USA). The normality of distribution of data was assessed using the Kolmogorov-Smirnov test. The continuous variables with normal distribution were presented as mean±standard deviation values, while those variables with skewed distribution were expressed as median (min–max) values. The categorical variables were denoted with numbers and percentages.

RESULTS

A total of 66 patients, of whom 29 were female (44%) and 37 (56%) were male, were enrolled in the study. The mean age of the patients was 63±9.4 years. The most common risk factors were history of gastrointestinal surgery in 15 (23%) patients, diabetes mellitus in 11 (17%) patients, trichophagia in 6 (9%) patients, and anxiety disorders in 4 (6%) patients. Accompanying endoscopic findings of the patients were gastric ulcer in 18 (27%) patients, duodenal ulcer in 7 (11%) patients, erosive gastritis in 13 (20%) patients, apical stenosis in 4 (6%) patients, and reflux esophagitis in 15 (23%) patients. Stage B reflux esophagitis was present in seven (11%) patients, while stage C reflux esophagitis was present in eight (12%) patients. Less common endoscopic findings were duodenal diverticula in one (1.5%) patient, esophageal stenosis in one (1.5%) patient, and presence of a foreign body in the esophagus in one (1.5%) patient. The demographic characteristics, risk factors, and endoscopic findings of the patients are summarized in Table 1.

Features of bezoars and number of endoscopic sessions are listed in Table 2. While bezoars were most commonly observed in the stomach in 46 (70%) patients, they were also detected in the duodenum in 8 (12%) patients, esophagus in 6 (9%) patients, anastomosis line in 5 (7.5%) patients, and in the efferent loop (1.5%) in a patient with history of stomach surgery. One (1.5%) patient had bezoars both in the stomach and the duodenum. Both of the patients with bezoar in the esophagus in our study had a history of Nissen fundoplication surgery.

Sixty patients had phytobezoar (91%) and six patients had trichobezoar (9%). All of the patients with trichobezoar in our study had a history of trichophagia. While the largest-sized bezoar was 10×8 cm in diameter, the one with the smallest size was 2×2 cm in diameter. The mean number of interventions for each patient was 1.5 (range, 1-6). A total of 44 patients underwent a single session (66.5%), while 13, 6, 2, and 1 of the patients underwent two, three, four, and six sessions, respectively.

The endoscopic success rate, causes of treatment failure, and applied surgeries are listed in Table 3. Bezoars were successfully removed with endoscopic intervention in 57 (86.5%) patients. For four patients in whom endoscopic

Table 1. Patients' demographic characteristics, risk factors, and endoscopic findings.

	N (%)
Sex (Female/Male)	29 (44)/37 (56)
Age	63±9.4
Risk factors	
Gastrointestinal surgery	15 (23)
Stomach	13 (20)
Bilroth 2 gastrectomy	9 (14)
Subtotal gastrectomy	4 (6)
Esophagus (Nissen fundoplication)	2 (3)
Diabetes mellitus	11 (17)
Trichophagia	6 (9)
Anxiety disorders	4 (6)
Endoscopic findings	
Gastric ulcer	18 (27)
Duodenal ulcer	7 (11)
Erosive gastritis	13 (20)
Apical stenosis	4 (6)
Reflux esophagitis	15 (23)
Los Angeles Stage B	7 (11)
Los Angeles Stage C	8 (12)
Duodenal diverticula	1 (1.5)
Esophageal stenosis	1 (1.5)
Foreign body in the esophagus	1 (1.5)

Table 2. Features of bezoars and number of endoscopic sessions.

	N (%)
Bezoar locations	
Stomach	46 (70)
Duodenum	8 (12)
Esophagus	6 (9)
Anastomosis line	5 (7.5)
Efferent loop	1 (1.5)
Stomach–duodenum	1 (1.5)
Bezoar type	
Phytobezoar	60 (91)
Trichobezoar	6 (9)
Bezoar size (mean long side±SD)	5.63±1.64
Bezoar with the smallest size	2×2 cm
Bezoar with the largest size	10×8 cm
Endoscopic session numbers (mean)	1.5 (range, 1–6)
1	44 (66.5)
2	13 (20)
3	6 (9)
4	2 (3)
6	1 (1.5)

Table 3. Endoscopic success rate, causes of treatment failure, and applied surgeries. .

	N (%)
Endoscopic success	57/66 (86.5)
Causes of treatment failure	
Trichobezoar resistant to endoscopic interventions	4 (6)
Phytobezoars with 7-10 cm diameters	4 (6)
Complicated with duodenal fistulization	1 (1.5)
Surgery	9 (13.5)
Gastrotomy	7 (10.5)
Gastroenterestomy	1 (1.5)
Fistula repair surgery	1 (1.5)
(duodenal colonic fistula)	

treatment failed, repeated endoscopy sessions were performed in order to fragment the trichobezoar. However, these four patients were referred to surgery because endoscopic intervention attempts failed. Another four patients, who had phytobezoars measuring 7-10 cm in diameter, underwent three endoscopic intervention sessions with no success. These patients were also referred to surgery. Another patient was referred to surgery because of duodenal fistulization. Among the patients referred to surgery, seven patients underwent gastrostomy (10.5%); one (1.5%) patient underwent gastroenterostomy because of concomitant pyloric stenosis; and one (1.5%) patient underwent fistula repair surgery because of development of duodenal fistula due to bezoar.

DISCUSSION

This study suggests that bezoars are more common among subjects with history of gastrointestinal surgery, diabetes mellitus, or psychiatric disorders; they are closely related to erosive diseases such as peptic ulcer and reflux esophagitis; and they can be successfully treated with endoscopic interventions. This is one of the most extensive studies on this subject in the literature. To the best of our knowledge, this study is the first to suggest the association of bezoars with esophagitis.

In this study, 8200 endoscopy records were screened and a total of 74 (0.09%) patients with bezoar were detected. In another study in which 49 patients with bezoar were

included, bezoars were reported to be rare cases and their rate was 0.068% (22). In the study by Mihai et al. (22), the mean age of the patients was 58 years, whereas the mean age of our patients was 63 years. These results indicated that bezoars occurred in subjects who were relatively older. In our study, bezoars were more commonly present in male patients. However, in the study by Iwamuro et al. (23), the incidence of bezoars was higher in the female gender (68.4%).

The most common risk factors in our study were history of gastrointestinal surgery, diabetes mellitus, and psychiatric disorders. In the study by Ersan et al. (24), history of gastrointestinal surgery was present in 47% of the patients, while the percentage of this risk factor was 57% in the study by Koulas et al. (25). In the study by Hewitt et al. (26), the rate of gastrointestinal surgery history was 32% compared to 23% in our study.

The fact that both of the patients with bezoar in the esophagus in our study had a history of Nissen fundoplication surgery indicated that this surgical intervention, which is commonly used in the treatment of hiatal hernia and reflux esophagitis, set the stage for esophageal bezoar. As a matter of fact, the occurrence of esophageal bezoar after repeated Nissen fundoplication surgeries was documented in a previous case report (27). Motility disorders are an important risk factor for esophageal bezoars. While there are studies that investigate the association between bezoar and motility disorders like achalasia (28), our study did not include any such cases to support such an association.

In our study, 17% of the patients had diabetes mellitus. Patients with long-term history of diabetes are reported to have gastroparesis at a rate of 5%-12% (29). Diabetic gastroparesis decreases motility and precipitates bezoar formation. Furthermore, gastric acid secretion may be reduced in patients with diabetes, and this condition may precipitate bezoar formation (30).

Psychiatric disorders were another important risk factor for bezoar formation in our study. The association of trichophagia and phytobezoar (Rapunzel syndrome) has been previously reported in several studies (31, 32). Likewise, the close relationship between trichobezoar and a history of trichophagia support this association. There were four patients with generalized anxiety disorder in our study. Several reports have suggested an association between generalized anxiety disorder and bezoar formation (33, 34).

The close relationship between bezoar and peptic ulcer disease is evident when the endoscopic findings accompanying bezoar are considered. In the study by Iwamuro et al. (23), the rate of peptic ulcer was 52.9% as opposed to 38% in our study. In our opinion, the main reason for the high rate of peptic ulcer in patients with bezoar may be the fact that these patients might have a prolonged exposure to gastric acid because of decreased motility. Another possible mechanism may be the pressure effect of the bezoar. Peptic ulcer and reflux esophagitis can be complications of bezoar due to mucosal pressure necrosis. Another important finding of our study was the high rate of stage B and C esophagitis (23%) in patients with bezoar. Esophagitis due to the pressure effect of esophageal bezoars is an expected finding. However, in our study, there was a high rate of esophagitis even in patients with bezoars in the stomach or other locations. Although concomitance of esophagitis and bezoar was previously reported in a case series (35), to the best of our knowledge, our study is the first to indicate an increased risk for severe esophagitis in patients with bezoars in the upper gastrointestinal system. The reason for this association might be the precipitation of acid reflux due to increased gastric pressure because of the bezoar. Another possible mechanism underlying esophagitis in patients with esophageal bezoar might be disruption of structural integrity or pressure effect of bezoar.

In our study, the most common location of bezoars was the stomach. Case series in the literature have indicated similar findings. In the study by Iwamuro et al. (36), the location of bezoar was the stomach in 29 of 31 patients. Although bezoars are most commonly observed in the stomach, unlike in other studies, the rate of esophageal and duodenal bezoars was 21% in our study. In the study by Park et al. (37), 32 patients had gastric bezoars while one patient had an esophageal bezoar and another patient had a duodenal bezoar. In this study, 13 patients had bezoars in multiple locations. Whereas the occurrence of bezoars in multiple locations is a rare condition, there are rare reports of giant bezoars extending from the stomach to the duodenum (38), as it was in one of our patients.

The most common bezoar type in our study was phytobezoar. Ersan et al. (24) found a similar rate of phytobezoars (85%) in their study. An average of 1.5 endoscopy sessions were performed for each patient in our study. While 66.5% of our patients underwent a single endoscopy session, the rest (33.5%) of the patients underwent two or more endoscopy sessions. Similarly, in the study by Park et al. (37), the mean number of endoscopy sessions

was 1.5. The rate of patients who underwent multiple endoscopy sessions in the study by Park et al. (37) (43%) was also similar to that in our study.

The success rate of endoscopic intervention in the treatment of bezoar was 86.5% in our study. The success rate of endoscopic treatment (88.7%) in the study by Mihai et al. (22) was also similar to ours. Likewise, Park et al. (37) reported a similar rate of endoscopic treatment success (89.7%). In nine of our patients, endoscopic treatment failed, and these patients were referred to surgery. In four patients, we failed to achieve cure with endoscopic intervention despite repeated endoscopic treatment attempts and utilization of other methods to facilitate the treatment. The main reason for failure with endoscopic treatment was the size of bezoars, which ranged between 7 cm and 10 cm. In addition, the endoscopic interventions failed in four of six patients with trichobezoar. There was no difference between the failed and the unfailed groups in terms of demographic characteristics like age, size, and history. The considerable difference between the success rate of endoscopic interventions in phytobezoars (>90%) and trichobezoars (approximately 30%) suggests that trichobezoars are resistant to endoscopic treatment. A literature search indicated that surgical treatment is preferred over endoscopic treatment in patients with trichobezoar (39). Kajal et al. (40) suggested that the major treatment option for cases with trichobezoar is surgery because of late presentation of these patients. It is also emphasized that prevention of recurrence requires concomitant treatment of psychiatric disorders such as trichophagia in these patients. With these results and in the light of the findings in the literature, we can affirm that trichobezoars are much more resistant to endoscopic treatment than phytobezoars because of the late presentation and additional psychiatric disorders and that early surgery must be considered. Furthermore, large phytobezoars resistant to endoscopic treatment or complicated bezoars with fistulization must be considered for early surgery.

Surgical treatment of bezoars are quite successful. In the study by Park et al. (37), the success rate for surgical treatment was 98%. However, previous reports have indicated that surgical treatment is associated with various rates of morbidity and mortality (25, 41). Although endoscopic treatment is prolonged and repeated sessions might be required for successful treatment of bezoars, endoscopic treatment is still the initial option of choice because of the aforementioned complications of surgery. Among our patients referred to surgery, seven underwent gastrostomy while one had gastroenterostomy and another one underwent fistula repair. In the study by Park et al. (37), the patients were treated with similar surgical interventions. In the study by Ersan et al. (24), 16 patients underwent gastrostomy and three patients underwent gastroenterostomy.

The main limitation of our study is the retrospective design. The treatment success in our study might have been influenced by the fact that dissolvers like cola and pineapple juice were used optionally, because of the retrospective design. However, the high rate of success (86%) despite optional utilization of adjunctive therapies indicates the effectiveness of endoscopic treatment.

In conclusion, gastric bezoars were rare and more commonly present in males and occurred in those who were relatively older. Phytobezoar was the most common bezoar type and was located primarily in the stomach. The findings of this study indicated that bezoars are more common among subjects with history of gastrointestinal surgery, diabetes mellitus, or psychiatric disorders. Gastric ulcer and reflux esophagitis were the most common complications.

In a majority of the patients, bezoars can be successfully treated using endoscopic measures; thus, these patients would be saved from the risks of surgery.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of Türkiye Yüksek Ihtisas Training and Research Hospital, Date: 11.01.2019 and Number: 29620911-929.

Informed Consent: Informed consent is not necessary due to the retrospective nature of this study.

Peer-review: Externally peer-reviewed.

Author contributions: Concept – V.K., M.K., S.K., M.A.K., O.C., E.K.; Design - V.K., M.K., S.K., M.A.K., O.C., E.K.; Supervision – V.K., M.K., S.K., M.A.K., O.C., E.K.; Resource – V.K., M.K., S.K., M.A.K., O.C., E.K.; Materials – V.K., M.K., S.K., M.A.K., O.C., E.K.; Data Collection and/or Processing – V.G.,M.K.,O.C.; Analysis and/or Interpretation -M.K., O.C., V.G.; Literature Search – V.G., M.K., S.K., M.A.K., O.C., E.K.; Writing – V.G.,M.K.; Critical Reviews – S.K.,M.A.K.,E.K.

Conflict of Interest: The authors have no conflict of interest to declare.

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

REFERENCES

1. Yeh J, Saul T, Gingrich A, Wassermann J. Bezoar. J Emerg Med 2013; 45: 615-6. ***[CrossRef]***

2. Byrne WJ. Foreign bodies, bezoars, and caustic ingestion. Gastrointest Endosc Clin N Am. 1994; 4: 99-119. [CrossRef]
3. Larbi N, Kaâbi S, Ben Salah K. Gastric and intestinal bezoars. Tunis Med 2003; 81: 949-55.
4. Yaqub S, Shafique M, Kjæstad E, et al. A safe treatment option for esophageal bezoars. Int J Surg Case Rep 2012; 3: 366-7. [CrossRef]
5. Ali WA, Gondal ZI, Yammahi AA, Hushki SF, Badri F, ElTayeb YH. A case of small bowel obstruction due to phytobezoars. J Surg Case Rep 2013; 2013: pii: rjt046. [CrossRef]
6. Nehme F, Rowe K, Nassif I. Pumpkin Seed Bezoar Causing Lower Gastrointestinal Bleeding. ACG Case Rep J 2017; 4: e49. [CrossRef]
7. Hennessy MM, Ivanovski I, Ó Súilleabháin CB. Gastric ulceration and perforation secondary to large trichobezoar - A case report describing the role of magnetic resonance imaging in diagnosis. Int J Surg Case Rep 2018; 43: 25-8. [CrossRef]
8. Elhajj II, Abbas J, Tawil AN, Mourad FH. Enterocutaneous fistula complicating a duodenal bezoar: an unusual presentation. Gastrointest Endosc 2005; 61: 877-8. [CrossRef]
9. Andrus CH, Ponsky JL. Bezoars: classification, pathophysiology, and treatment. Am J Gastroenterol 1988; 83: 476-8.
10. 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: 960-4. [CrossRef]
11. Ben-Porat T, Sherf Dagan S, Goldenshluger A, Yuval JB, Elazary R. Gastrointestinal phytobezoar following bariatric surgery: Systematic review. Surg Obes Relat Dis 2016; 12: 1747-54. [CrossRef]
12. Dhakal OP, Dhakal M, Bhandari D. Phytobezoar leading to gastric outlet obstruction in a patient with diabetes. BMJ Case Rep 2014; 2014. [CrossRef]
13. Zhao JL, Zhao WC, Wang YS. Endoscopic retrieval of gastric trichophytobezoar: Case report of a 12-year-old girl with trichophagia. Medicine (Baltimore) 2017; 96: e5969. [CrossRef]
14. Cerezo Ruiz A, Domínguez Jiménez JL, Uceda-Vaño A. Cellulase, Coca-Cola®, pancreatin and ursodeoxycholic acid in the dissolution of gastric bezoars: why not all together? Rev Esp Enferm Dig 2018; 110: 472-3. [CrossRef]
15. Castle SL, Zmora O, Papillon S, Levin D, Stein JE. Management of Complicated Gastric Bezoars in Children and Adolescents. Isr Med Assoc J 2015; 17: 541-4.
16. Horesh N, Rosin D, Dreznik Y, et al. A Single Tertiary Center 10-Year Experience in the Surgical Management of Gastrointestinal Bezoars. J Laparoendosc Adv Surg Tech A 2018; 28: 967-71. [CrossRef]
17. Camacho Dorado C, Sánchez Gallego A, Miota de Llama JI, González Masiá JA. Metallic bezoar after suicide attempt. Cir Esp 2018 Mar 19. pii: S0009-739X(18)30078-2.
18. Verma VK. Plastic bezoars-a unique introduction in bezoars family. Indian J Surg 2013; 75(Suppl 1): 51-3. [CrossRef]
19. Caputo F, Barranco R, Bonsignore A, Fraternali Orcioni G, Ventura F. A Rare Case of Fatal Bowel Obstruction Secondary to a Colonic Bezoar. Am J Forensic Med Pathol 2018; 39: 38-40. [CrossRef]
20. Sharma D, Srivastava M, Babu R, Anand R, Rohtagi A, Thomas S. Laparoscopic treatment of gastric bezoar. JSLS 2010; 14: 263-7. [CrossRef]
21. Armstrong D, Bennett JR, Blum AL, et al. The endoscopic assessment of oesophagits: a progress report on observer agreement. Gastroenterology 1996; 111: 85-92 [CrossRef]
22. Mihai C, Mihai B, Drug V, Cijevschi Prelipcean C. Gastric bezoars--diagnostic and therapeutic challenges. J Gastrointestin Liver Dis 2013; 22: 111.
23. Iwamuro M, Tanaka S, Shiode J, et al. Clinical characteristics and treatment outcomes of nineteen Japanese patients with gastrointestinal bezoars. Intern Med 2014; 53: 1099-105. [CrossRef]
24. Ersan Y, Yavuz N, Yüceyar S, et al. Gastric bezoars requiring surgical treatment. Cerrahpaşa J Med 2005; 36: 128-33.
25. Koulas SG, Zikos N, Charalampous C, Christodoulou K, Sakkas L, Katsamakis N. Management of gastrointestinal bezoars: an analysis of 23 cases. Int Surg 2008; 93: 95-8.
26. Hewitt AN, Levine MS, Rubesin SE, Laufer I. Gastric bezoars: reassessment of clinical and radiographic findings in 19 patients. Br J Radiol 2009; 82: 901-7. [CrossRef]
27. Georgiev YP, Karashmalakov AG, Zafirov GK. Esophageal bezoar after repeated fundoplications. Quant Imaging Med Surg 2018; 8: 257-8. [CrossRef]
28. Liang JJ, Murray JA. Esophageal bezoar in the setting of achalasia. Dis Esophagus 2016; 29: 686. [CrossRef]
29. Camilleri M. Diabetic gastroparesis. N Engl J Med 2007; 356: 820-9. [CrossRef]
30. Emerson AP. Foods high in fiber and phytobezoar formation. J Am Diet Assoc 1987; 87: 1675-7.
31. Prasad A, Jain A, Gupta A, Kamra A. Trichobezoar: Ravenous for Hair. Euroasian J Hepatogastroenterol 2018; 8: 97-8. [CrossRef]
32. Lalith S, Gopalakrishnan KL, Ilangovan G, Jayajothi A. Rapunzel Syndrome. J Clin Diagn Res 2017; 11: TD01-2. [CrossRef]
33. Jain K, Chamania S, Sabhaney JW. Recurrent trichobezoar due to psychosocial stress. J Indian Med Assoc 1987; 85: 363-4.
34. Kumar Bn A, Kumar L N, Thippeswamy J, Rangaswamaiah LN. Trichobezoar (Rapunzel syndrome) in an adolescent patient with Trichotillomania and Generalized Anxiety Disorder: A case report. Asian J Psychiatr 2016; 23: 44-5. [CrossRef]
35. Hutter D, Akgun S, Ramamoorthy R, Dever LL. Medication bezoar and esophagitis in a patient with HIV infection receiving combination antiretroviral therapy. Am J Med 2000; 108: 684-5. [CrossRef]
36. 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. [CrossRef]
37. Park SE, Ahn JY, Jung HY, et al. Clinical outcomes associated with treatment modalities for gastrointestinal bezoars. Gut Liver 2014; 8: 400-7. [CrossRef]
38. Kumar R, Anand U. An unusual case of large gastro-duodenal bezoars. Med J Armed Forces India 2016; 72: 406-7. [CrossRef]
39. Szor DJ, Dias AR. Gastric trichobezoar. Clin Case Rep 2017; 5: 1907. [CrossRef]
40. Kajal P, Bhutani N, Tyagi N, Arya P. Trichobezoar with and without Rapunzel syndrome in paediatric population: A case series from a tertiary care centre of Northern India. Int J Surg Case Rep 2017; 40: 23-6. [CrossRef]
41. Erzurumlu K, Malazgirt Z, Bektas A, et al. Gastrointestinal be¬zoars: a retrospective analysis of 34 cases. World J Gastroenterol 2005; 11: 1813-7. [CrossRef]