

Amlookobezoar': A Case Series on Diospyrobezoars Causing acute Small bowel Obstruction

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Abstract

Introduction: Bezoars are non-dissolved hard masses of undigested or partially digested food or foreign material trapped in the gastrointestinal tract, broadly classified into four groups: phytobezoars, trichobezoars, lactobezoars, and pharmacobezoars. In the Indian subcontinent, the persimmon fruit is called 'amlook'; hence, phytobezoars resulting from the ingestion of the unripe or excessive amlook are called 'amlookobezoars' in local medical vernacular or dialect. To describe the clinical profile and treatment outcome of a series of patients presenting with small bowel obstruction (SBO) due to amlookobezoars.

Case Presentation: Five patients of SBO caused by amlookbezoar were evaluated with a detailed history, physical examination, and radiological assessment to confirm the diagnosis. The radiological assessment included abdominal X-rays, ultrasonography, and contrast-enhanced computed tomography. We had five cases of SBO caused by amlookobezoars. The age of these patients ranged from 8 to 22 years, with a male-female ratio of 4:1. All five patients presented in autumn. None had any other significant predisposing factor for bezoar formation except consuming considerable amounts of amlooks 3–10 days earlier. Four patients eventually required an exploratory laparotomy; all had soft to firm bezoars stuck in the distal or mid-ileum. For these four patients, we manually broke down the amlookobezoars and milked them down beyond the ileocaecal level without requiring any enterotomy, gut resection, or stoma creation, and the postoperative period was almost uneventful.

Conclusion: Though uncommon, amlookobezoars should be considered a differential diagnosis in small bowel obstruction. Amlookobezoars commonly affect young adolescent males in the autumn months and often need a laparotomy with fragmentation and milking.

Keywords: Bezoar, Amlookobezoar, Diospyrobezoar, Small bowel obstruction, Persimmon, Amlook

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Introduction

Bezoars are non-dissolved hard masses of undigested or partially digested food or foreign material trapped in the gastrointestinal tract. Though most commonly seen in the stomach, they can get trapped anywhere from the esophagus to the rectum (1, 2). The word bezoar is derived either from the Persian word ‘pādzahr’ or the Arabic term ‘badzehr,’ both literally meaning “antidote” or counter-poison (3, 4). In ancient times, ground forms of bezoars from animals were used as antidotes to various poisons and as remedies for several maladies. Though the presence of symptomatic bezoars in the gastrointestinal tract is rare, an estimated incidence of bezoar formation in the general population is around 1% (5, 6).

Depending upon the contents, bezoars are broadly classified into four groups: phytobezoars, trichobezoars, lactobezoars, and pharmacobezoars. Phytobezoars are the most common type of bezoars, composed of indigestible material of plant origin (fibers, fruit skins, seeds, etc.); they are frequently reported in patients with impaired digestion and decreased gastric motility. Biochemically, these phytobezoars comprise indigestible cellulose, hemicellulose, lignin, and fruit tannins. Trichobezoar are commonly called as hair-balls and are formed from ingested hair (7). Trichobezoars are frequently seen in patients with Rapunzel syndrome. The Rapunzel syndrome presents with the principal symptoms of vomiting and epigastric pain due to an unusual form of trichobezoar found in some psychiatric patients. These Rapunzel syndrome patients have a history of trichotillomania (habit of hair pulling) and trichophagia (morbid habit of chewing the hair), consequently developing gastric bezoars requiring surgery. Lactobezoars are a specific food type comprising undigested and inspissated milk, most commonly seen in premature infants receiving formula feeds. Pharmacobezoars are formed after ingesting various medicinal formulations and are undissolved tablets or semiliquid masses of drugs. Pharmacobezoars are often found following overdose or prolonged use of sustained-release medications (8).

Phytobezoars occur more frequently in patients with dentition problems, impaired digestion, and patients subjected to gastric surgery or with clinical conditions that delay gastric emptying (9). Other predisposing factors are excessive ingestion of high-fiber foods, inadequate chewing, diminished gastric secretion, gastro-neuropathy in diabetic patients, hypothyroidism, myotonic dystrophy, postoperative adhesions, and excessive consumption of persimmons (10, 11). One common subtype of phytobezoars is diospyrobezoars, caused by ingesting unripe persimmons (*Diospyros kaki*). In the Indian subcontinent, the persimmon fruit is called ‘amlook’ (Figures 1 and 2); hence, phytobezoars resulting from the ingestion of unripe or excessive

amlooks are referred as ‘amlookobezoars’ in local medical vernacular or dialect. This article will refer to a diospyrobezoar as an ‘amlookobezoar.’ Amlookobezoars are harder than other types of phytobezoars. Phytobezoars are often resistant to drug treatment and are usually removed endoscopically or surgically. The efficacy of administering Coca-Cola for the dissolution of phytobezoars was recently reported. Like other phytobezoars, amlookobezoar patients usually present with abdominal pain and distension, vomiting, constipation, and other features of small bowel obstruction (SBO).

This study aimed to describe the clinical profile and treatment outcome of a series of patients with SBO caused by amlookobezoars (diospyrobezoars).

Methods

This case-series study was conducted at the Department of General and Minimal Invasive Surgery of Government Medical College Rajouri, Kashmir. Prospectively, all age-group patients of both sexes presenting with SBO due to an amlookobezoar from September 2021 to November 2022 were included in this study. Patients with other



Figure 1: Fresh ripe persimmon (amlook) fruit.



Figure 2; Dried persimmon (amlook) fruit.

causes of SBO, like adhesion obstruction; worm obstruction; tumors, SBO caused due to obstructed inguinal or internal hernias, small gut volvulus, etc., were excluded from the study. Also, patients with SBO due to other phytobezoars with no significant history of recent ingestion of amlooks (persimmons) were excluded. All patients were evaluated with a detailed history, physical examination, and radiological assessment to confirm the diagnosis. The radiological assessment included abdominal X-rays, ultrasonography, and contrast-enhanced computed tomography. The parameters studied were age, sex, level of obstruction, clinical presentations, surgical intervention, patient complications, and outcome.

Ethics

This study was approved by the Institutional Ethics Committee, Government Medical College, Rajouri (GMCR/IEC/2022-23).

Results

After excluding the cases of SBO caused due to other pathologies, we had five cases of SBO caused due to amlookobezoars. Among them, four were males, and one was female. The age of these patients ranged from 8 to 22 years. All five patients in this series presented with the features of SBO in the autumn months of September to November, corresponding to the ripening and harvesting season for this fruit. All the patients presented with the clinical features of abdominal pain, distension, and constipation. Only two patients had a history of vomiting at the time of presentation. However, none of the patients had a fever or other features of peritonitis and sepsis at presentation. None of our patients had any history of previous abdominal surgery or other significant predisposing factors for bezoar formation except consuming significant amounts of amlooks (persimmon fruit) 3–10 days earlier.

After baseline blood investigations, the patients underwent an upright abdominal X-ray and abdominal ultrasonography. The X-rays showed air-fluid levels with varied degrees of small gut dilatation and other features of SBO, whereas the USG reported dilated gut loops with sluggish peristalsis. After suspecting bowel obstruction on clinical and X-ray findings, contrast-enhanced computed tomography of the abdomen was requested (Figures 3 and 4), confirming the diagnosis of SBO with an intraluminal mechanical cause. None of our patients had a significant history of diabetes mellitus, hypothyroidism, or prolonged intestinal transit.

A trial of conservative management was initially given to all five patients, involving adequate and appropriate intravenous fluids, broad-spectrum antibiotics, nil-per oral, Ryle's tube aspiration, and proctoclysis enemas for a period of 48-72 hours. Only one of five patients responded to the conservative treatment protocol and was deflated fully after four

days. However, four patients eventually required an exploratory laparotomy via a midline incision under general anesthesia.

On exploration, all four patients had soft to firm bezoars stuck in the distal or mid-ileum with dilatation of the proximal small intestine. However, none of the patients had any bowel perforation, peritonitis, or ischemic bowel changes. Fortunately, in all these four patients, we manually broke the amlookobezoars and milked them down beyond the ileocaecal level without needing an enterotomy, gut resection, or stoma creation. The postoperative period was almost uneventful in all four operated patients. Patients were allowed clear water sips on



Figure 3: A computed tomography image of the patient shows features of small bowel obstruction.

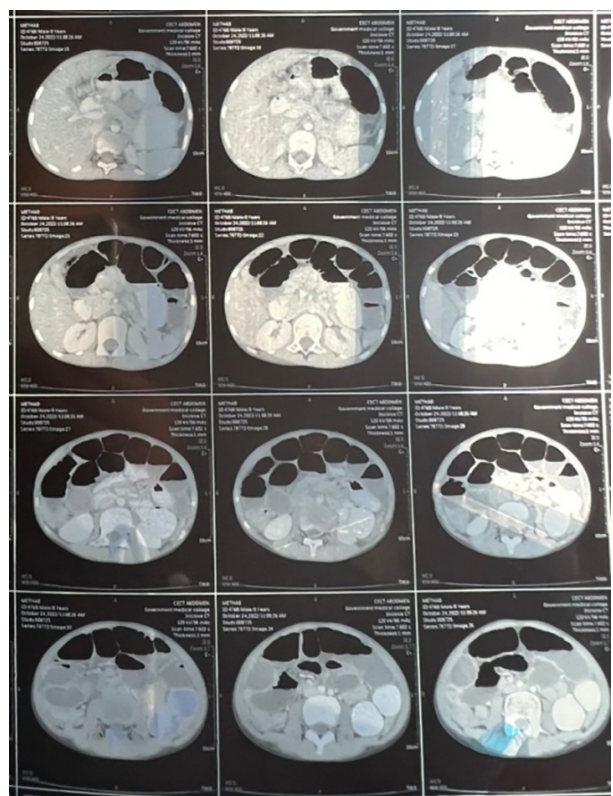


Figure 4: Contrast-enhanced computed tomography images of the patient indicate small bowel obstruction due to a terminal ileal amlookobezoar.

the 2nd postoperative day (POD) and soft oral on the 3rd to 4th POD. Ryle's tube was removed on the 2nd to 3rd POD, and bowel movements were noted on the 2nd to 4th POD. One of the patients developed a superficial surgical site infection. All four operated patients were discharged uneventfully from the hospital on the 6th to 8th POD. None of the patients had any postoperative fever, vomiting, excessive or purulent drainage, electrolyte imbalance, or recurrent obstruction. After discharge, the patients were followed weekly initially and then fortnightly. However, till now, no delayed complication has been reported in any of them.

Discussion

A phytobezoar, a concretion in the gastrointestinal tract of indigestible fibers and seeds derived from ingested vegetables and fruits, is the most common type of bezoar (10). Diospyrobezoars or amlookobezoars are a subtype of phytobezoars formed after intake of unripe or excessive persimmons (*Diospyros kaki*). Amlookobezoars have been reported more frequently in temperate and subtropical regions (12). Amlook or persimmon fruit is rich in fiber and calories. Its pulp consists primarily of mucilage and pectin substances, which are responsible for the characteristic appearance of the fruit (10, 13, 14). It contains a high concentration of tannin, which can precipitate when it comes in contact with gastric juice. In the presence of dilute hydrochloric acid inside the stomach, tannin undergoes polymerization to form a coagulum that includes cellulose, hemicellulose, and protein, forming the basis of the bezoar (14). Subsequently, this coagulum undergoes dehydration, contributing to the formation of the amlookobezoar or diospyrobezoar.

All our five patients presented with sub-acute to acute SBO. Among them, four required surgical intervention. Though phytobezoars are well recognized as an etiological factor for SBO, the true incidence of intestinal obstruction caused by phytobezoars is still poorly understood. Yakan et al., in 2010 (15), reported 432 cases of SBO over ten years, finding that phytobezoars caused only 14 cases (3.2%). A recent meta-analysis of 19 studies published between 1994 and 2005 showed that out of 996 cases of acute SBO, only 8 (0.8%) were due to a bezoar in the small bowel. This makes bezoars the fifth most frequent cause of acute SBO after adhesions (83.2%), external hernias (3.1%), malignancy (2.9%), and internal hernias (1.9%) (16).

All patients in our series presented with SBO in the autumn months of September to November, corresponding to the persimmon's ripening and harvesting season. In the mid-autumn festival in Hong Kong, it is a tradition to eat persimmon fruit during the festival, celebrated in October (17). Chisholm et al. (18) reported that two-thirds of the

patients of phytobezoars in their series presented around this festival time. Krausz et al. (13) also reported an increase in the incidence of patients with phytobezoar obstruction related to the increased availability and popularity of the persimmon fruit.

Postoperative adhesions are considered one of the predisposing factors for bezoar formation (6). A recent study showed that the main predisposing factors were previous abdominal surgery (especially gastric surgery) in 87.5% and the total absence of teeth in 14.3% of patients (15). However, contrary to these findings, all our cases were young patients with adequate dentation without any history of past abdominal operations. None of our patients had adhesion obstruction, as we had already excluded such patients from our study. Though diabetes mellitus, hypothyroidism, and previous gastric surgeries (19, 20) are considered predisposing factors for phytobezoar formation, none of our patients had a significant history of such conditions, prolonged intestinal transit, or myotonic dystrophy. Four patients in our study who required laparotomy had amlookobezoars stuck at the mid or terminal ileum. Andrea P. et al. reported a cylindrical diospyrobezoar in a 66-year-old diabetic man impacted about 15 cm proximal to the ileocecal valve (10).

All patients in our series had a significant history of recent ingestion of amlook fruit (persimmon). In our series, 4 (80%) patients ultimately required surgical intervention for treatment. Mami Yamamoto et al. (21) reported a case of an 87-year elderly female with SBO caused by ingesting a huge, dried persimmon. She was initially treated conservatively but ultimately required removal by enterotomy as the conservative therapy failed. Similarly, Naotake Funamizu et al. (22) reported SBO in a 67-year-old Japanese female who regularly consumed persimmons in autumn. And after ten days of failed conservative treatment, surgery was scheduled because the ileus tube could not relieve the obstruction. In view of a previous history of Cesarean section, they suspected an adhesion as the cause of SBO. However, they found a huge (7.0×4.5×4.0 cm) persimmon bezoar impacted about 60 cm from the ileocecal valve. The patient needed ileal resection. The authors concluded that their case serves as an important reminder to obtain proper dietary history to investigate all possible causes of SBO.

Seung Soo Ha et al. (23) reported an unusual case of acute SBO caused by a persimmon phytobezoar, which was dissolved with endoscopic Coca-Cola therapy. Similarly, Thomas Zheng JT et al. (24) reported a case of multiple persimmon phytobezoars causing simultaneous small bowel and gastric outlet obstruction. A 5-cm phytobezoar was retrieved through an enterotomy with primary repair in the distal small bowel. Another 15 cm × 6 cm sausage-shaped phytobezoar was retrieved from the stomach through a gastrotomy with primary repair. They postulated that the small bowel phytobezoar

represented the 'daughter' phytobezoar from the 'parent' giant gastric phytobezoar. A few more cases reported in the literature note that persimmons cause intestinal obstruction (1, 25).

E M Chisholm et al. (18), in their relatively larger original series on phytobezoars from Hong Kong, reported that laparotomy was required on 15 occasions. The bezoars were milked into the cecum in 10 instances, removed through an enterotomy in four cases, and operated via a small bowel resection in one patient (18). Five patients had a history of ingesting persimmons, grapefruits, or dried plums, and seven patients presented in September or October when persimmons were in season in Hong Kong (18).

Raheel Hussan Naqvi et al. (26), in an observational retrospective study, reported that the median age of patients with food bolus obstruction was 14 years, with a male-to-female ratio of 3:1. They reported that 97% of cases had a history of ingestion of persimmons, and the most common site of impaction was the ileum (63%). About 90% of cases were managed by fragmentation and milking down the impacted food bolus. Finally, the authors concluded that food bolus obstruction, especially due to phytobezoars of diospyrobezoar type, is often encountered in their setup, especially in rural populations, predominantly affecting male children and adolescents.

Conclusion

Amlookobezoars, though an uncommon cause of SBO, should not be overlooked. They commonly affect young adolescent males in autumn, often necessitating a laparotomy with fragmentation and

milking. However, this case series also reminds us to obtain a detailed dietary history and examine all the possible causes of SBO. Finally, we recommend that physicians and surgeons counsel patients to avoid the excessive ingestion of persimmons, which might help reduce the incidence of amlookobezoars.

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Authors' Contribution

Study concept and design: Mudassir Ahmad Khan. Analysis and interpretation of data: Zakir Hussain, Mushtaq Ahmed Chowdhary, Gopal Sharma. Drafting of the manuscript: Amir Chowhan, Barinder Kumar. Critical revision of the manuscript for important intellectual content: Yasir Mahmood, Mansoor Ul Haq, Vikas Kumar. All authors approved this publication.

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