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INTESTINAL OBSTRUCTION DUE TO BEZOARS –A REVIEW

Surgery

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ABSTRACT

A bezoar is a tightly packed collection of partially digested or undigested material that most commonly occurs in the stomach. It may be found in any part of GIT. Bezoars are responsible for 0.4%-4% of cases of mechanical intestinal obstruction. The clinical findings of bezoar-induced ileus do not differ from those of mechanical intestinal obstruction due to other causes.Gastric bezoars can occur in all age groups and often occur in patients with behaviouraldisorders, abnormal gastric emptying, or altered gastrointestinal anatomy. Many bezoars are asymptomatic, but some causes symptoms.. The appearance and localization of bezoars can be established with various imaging methods.Treatment of choice depends on the localization of the bezoar which makes the clinical findings.Some bezoars can be dissolved chemically, others require endoscopic removal, and some even require surgery.

A pseudobezoar is an indigestible object introduced intentionally into the digestive system ,such as a gastric balloon for reducing the size of stomach.

AIM- This review aims to summarize the definition and history, causes of bezoar formation, clinical findings, diagnostic methods, treatment of the rare intestinal obstructions caused by bezoars.

KEYWORDS

DEFINITION AND HISTORY

The term bezoar refers to an intraluminal mass in the gastrointestinal system caused by the accumulation of indigestible ingested materials, such as vegetables, fruits, and hair. It is also called "panzehr" in Arabic and "padzhar" in Persian, the term means antidote. Although there is written evidence of bezoars identified in animal and human gastrointestinal systems in the 10th century AD. The first scientific definition was made by Baudmant with the publication of a case of trichobezoar in 1779. In 1854, Quain named the mass of intragastric food residue found at autopsy a "bezoar". The first preoperative trichobezoar case was reported by Stelzner[4] in 1894.

The word "bezoar" comes from the Persian *pād-zahr* (پادزهـــر)(Arabic "bazahr" or "badzehr"), which literally means "antidote. Till the 19th century, bezoars obtained from sacrificed animals had been widely used as antidote .It was thought to be to be antidote of poisons.This was disproved in 1575 by French surgeon AmbroiseParé who did an experiment to test the properties of the bezoar stone in a cook of king, who took poison as a punishment for stealing fine silver cutlery . AmbroiseParé then used the bezoar stone to no great avail, as the cook died in agony seven hours after taking poison.

There are of different types of bezoars:

By content

A) **Food boluses** ,are composed of loose aggregates of food items such as seeds, fruit pith, or pits, shellac, bubble gum, soil, and concretions of some medications.
B) **Lactobezoar** is comprised of inspissated milk. It is most commonly seen in premature infants receiving formula foods.
C) **Pharmacobezoars** are mostly tablets or semiliquid masses of drugs, normally found following overdose of sustained-release medications.particularly common with sucralfate and aluminum hydroxide gel.
D) **Phytobezoars**are composed of indigestible plant material (e.g., cellulose), and are frequently reported in patients with impaired digestion and decreased gastric motility.
E) **Diospyrobezoar** is a type formed from unripe persimmons.
F) **Trichobezoar** is a bezoar formed from hair – an extreme form of hairball.Found in humans who frequently consumehairs.

Rapunzel syndrome is an extremely rare intestinal condition in humans resulting from ingesting hair (trichophagia). The syndrome is named after the long-haired girl Rapunzel in the fairy tale by the Brothers Grimm. Trichophagia is sometimes associated with the hair-pulling disorder trichotillomania. This syndrome is a rare and unusual form of trichobezoar.

G) Industrial materials bezoars are due to wood trashes, polystyrene, and plastics which are used for making bags,knitting chairs and charpoys.

By location

A) A bezoar in the esophagus is common in young children and in horses. In horses, it is known as choke.
B) A bezoar in the large intestine is known as a fecolith.
C) A bezoar in the trachea is called a tracheobezoar.

(particularly common with sucralfate and aluminum hydroxide gel).

CAUSES OF BEZOAR FORMATION

Previous gastric surgery

Gastric motility disorders and hypoacidity after gastric surgery are the basis of bezoar formation. Bezoars located in the stomach can pass through the small intestines easily and cause symptoms of intestinal obstruction, especially in patients with pyloric dysfunction after a pyloroplasty or wide gastrojejunostomy, resulting in a wide gastric outlet. In a study of 42 diseases, Kement et al reported that previous gastric surgery was the most important factor predisposing to bezoar formation, with a rate of 48%.

In patients who have had surgery for ulcer treatment, a vagotomy accompanied by a partial gastrectomy is the most important factor predisposing to bezoar formation. A vagotomy and partial gastrectomy reduce gastric acidity, negatively affecting peptic activity. Furthermore, the antrum has an important role in the mechanical digestion of ingested food. The pylorus also prevents ingested food from passing through the small intestine as bolus, contributing to digestion. In this regard, the risk of bezoar formation was higher in patients who had a pyloroplasty and antrectomy. The time taken for a bezoar to form after gastric surgery ranges from 9 mo to 30 years.

Bezoars can also form primarily in the small intestine when a mechanical factor alters the small intestinal passage, such as a diverticulum, stricture, or tumor. Primary bezoars of the small intestine almost always cause intestinal obstruction. The most common location of obstruction is the terminal ileum.

High-fiber diet

High-fiber foods such as celery, pumpkins, grape skins, prunes, and especially persimmons are a risk factor for bezoar formation. Persimmons, which means the "God of fruits" in Greek, are the fruit of plants in the genus *Diospyros*. Immature persimmons contain tannins, which form an adhesive-like substance when they encounter acids and

hold other food residues, causing bezoar formation. Krausz et al and Erzurumlu et al reported that 17% to 91% of bezoars in their series were caused by persimmons.

Other factors

Other factors predisposing to bezoar formation include systemic diseases such as hypothyroidism causing impaired gastrointestinal motility, postoperative adhesions, diabetes mellitus, Guillain-*Barré* syndrome, and myotonic dystrophy. Personal factors such as swallowing a large amount of food without sufficient chewing due to dental problems, especially in the elderly, the use of medications slowing gastrointestinal motility, and renal failure are also predisposing factors. Erzurumlu et al suggested that bezoar formation could occur without any predisposing factors.

CLINICAL FINDINGS

The clinical findings of bezoar-induced ileus do not differ from those of mechanical intestinal obstruction due to other causes. Almost all patients have poorly localized abdominal pain that is similar to ischemic pain. Other symptoms include abdominal distention, vomiting, nausea, a sense of satiety, dysphagia, anorexia, weight loss, gastrointestinal hemorrhage, and constipation.

It is generally difficult to determine whether bezoars are the clinical cause of ileus. The great majority of patients have a history of abdominal surgery, and adhesions following previous surgery are often responsible for ileus. To reduce mortality and morbidity, it is important to consider bezoars in patients with a history of gastric surgery because the treatment of intestinal obstruction suspected of being induced by bezoars is mostly surgical. Prompt treatment can minimize the complications that might develop during medical follow-up.

Symptoms and Signs

Most bezoars cause no symptoms because they don't completely block the digestive tract. Where symptoms do appear, these may include:-

- feeling full after eating very little food
- a lack of appetite
- nausea
- vomiting
- abdominal pain
- weight loss
- anemia

Complications:-

Rarely, bezoars cause serious complications which includes,

- Gastric outlet obstruction
- Gastrointestinal bleeding
- secondary to ulceration,
- Ileus and intestinal obstruction
- Perforation ·and peritonitis
- Intussusception

Bezoars in children:-

Although older adults are generally at greater risk for phytobezoars, certain types of bezoars are more often found in children. Lactobezoars are the most common type to affect infants.

Risk factors of lactobezoars in infants include:

- dehydration
- prematurity and low birth weight (an immature gastrointestinal tract)
- consumption of high-calorie formula
- addition of thickening agents, such as pectin, to formula

Trichobezoars are usually found in young females who suck, chew, and swallow their own hair. The presence of a trichobezoar may indicate an underlying psychiatric issue.

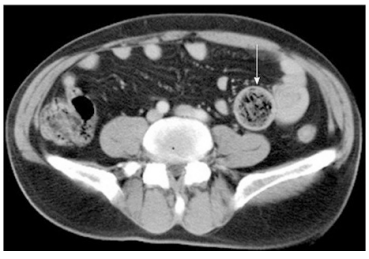
DIAGNOSTIC METHODS

Plain xray abdomen---Recent advances in imaging methods have facilitated the diagnosis of ileusThe air-fluid levels associated with mechanical intestinal obstruction can be seen on plain X-rays in most patients, but plain radiographs are not useful for differentiating other causes of ileus.

Barium meal studies-The appearance and localization of bezoars can be established with barium studies, which are effective for differentiating diverticular disease, intraluminal adenomas, primary malignancies of the small intestine causing mechanical obstruction, and bezoars. However, these studies are not applicability in an emergency setting, can exacerbate peritonitis in the presence of perforation, and increase symptoms in complete obstruction.

Ultrasonogrphy-Ultrasonography can detect the cause in 88%-93% of bezoar-induced ileus. Typically, bezoars create hyperechoic acoustic shading on ultrasonography. However, the place of ultrasonography is controversial, since the examination is operator-dependent and requires experience. Furthermore, the air-fluid levels in the obstructed intestines block the view and ultrasonography has low sensitivity when there are multiple bezoars.

CECT Abdomen--The most valuable method for determining the location and etiology of intestinal obstructions is contrast-enhanced computed tomography (CT) . The sensitivity and specificity of abdominal CT for bezoar-induced ileus are 90% and 57%, respectively. Abdominal CT is effective for excluding other causes of intestinal obstruction. The advantages of CT are its ability to detect dilatation and edema in the intestinal loops, the presence of intra-abdominal free fluid, and the level of obstruction and development of strangulation. Zissin et al reported that a round, mottled intraluminal mass in the area of obstruction with dilated intestinal loops proximally and collapse distally was a pathognomonic CT finding for a bezoar resulting in ileus. Air bubbles might be seen within bezoars. When there are multiple bezoars, intraluminal bezoars distant from the area of obstruction area might go unnoticed if not sought carefully.



Intraluminal round bezoar and mottled gas pattern were seen in the jejenum segment. Wall thickening due to inflammation were seen at the obstruction site (arrow).

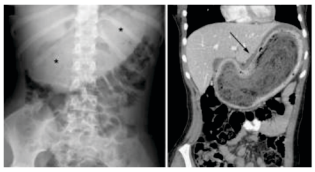
Feces in the small bowel can appear similar to a bezoar radiologically and are seen in about 8% of the patients treated for intestinal obstruction. Their radiological differentiation from bezoars is important because the treatment is generally medical. Small bowel feces generally appear in a longer segment than the bezoar and cause sharp-margin dilatation. Zissin et al reported that the most evident radiological feature for differentiating a bezoar and small bowel feces was the longer transition zone of the feces-like view in the dilated segments proximal to the obstruction in small bowel feces compared to bezoar.

Preoperative CT assessment in patients with suspected intestinal obstruction induced by bezoars is helpful for determining the timing of surgery. When a bezoar is detected on CT, the surgery is generally performed within 48 h. For small intestinal obstructions thought to result from non-bezoar causes, such as previous surgery, most patients can be treated medically, instead of surgically. A preoperative CT assessment allows the diagnosis of complications, such as perforation, necrosis, and ischemia secondary to bezoar-induced obstruction, and facilitates the planning of the timing of the surgical intervention.

Endoscopy-

Bezoars are typically observed as a single mass, but they can comprise multiple masses. They may range in color from brown, green, yellow, or even black.Material may be taken to know the constituent of bezoar.

Bezoar (Imaging Study Findings)



Upper endoscopy is usually done to confirm the diagnosis. On

endoscopy, bezoars have an unmistakable irregular surface and may range in color from yellow-green to gray-black. An endoscopic biopsy that yields hair or plant material is diagnostic.

Treatment

- Chemical dissolution
- Endoscopic removal
- Sometimes surgery

- **Chemical dissolution** using agents such as cola and cellulase can be done for patients with mild symptoms .Cellulase dosage is 3 to 5 g dissolved in 300 to 500 mL of water; this is taken over the course of a day for 2 to 5 days. Metoclopramide 10 mg orally is often given as an adjunct to promote gastric motility. Enzymatic digestion using papain is no longer recommended.
- **Endoscopic removal** is indicated for patients who have bezoars that fail to dissolve, moderate to severe symptoms due to large bezoars, or both. If initial diagnosis is made by endoscopy, removal can be attempted at that time. Fragmentation with forceps, wire snare, jet spray, argon plasma coagulation, or even laser may break up bezoars, allowing them to pass or be extracted.
- **Surgery** is reserved for cases in which chemical dissolution and endoscopic intervention cannot be done or have failed, for patients with complications, or for patients with intestinal bezoars.
- Persimmon fruit bezoars are usually hard and difficult to treat because persimmons contain the tannin shibuol, which polymerizes in the stomach. They do not respond well to chemical dissolution and usually require endoscopic or surgical removal.
- The optimal therapeutic intervention is controversial because randomized controlled trials comparing different options have not been done. Sometimes, combination therapy is required.

When a patient of intestinal obstruction due to bezoar comes ,we should do his physical assessment and treat accordingly.

The initial treatment of bezoars causing obstruction is no different from that for obstructions of other etiologies. With intestinal obstruction, fluid deficiency and electrolyte imbalances result from vomiting and fluid accumulation within the intestinal segment. Therefore, the first step in treatment is intestinal decompression and fluid-electrolyte replacement.

The most common location of bezoars in the gastrointestinal system is the stomach, although gastric bezoars usually do not cause obstruction. Therefore, endoscopic methods have become the main treatment. Mechanical disintegration (mechanical lithotripter, large polypectomy snare, electrosurgical knife, drilling, laser destruction, and a Dormia basket for extraction) and chemical dissolution (saline solution, hydrochloric acid, sodium bicarbonate, and Coca-Cola lavage) methods have been described.Ladas et al reported a very high success rate (90%) in gastric bezoars using a combination of mechanical and chemical methods. The treatment of choice is surgical for gastric bezoars in which endoscopic treatment failed.

Bezoar-induced intestinal obstructions occur mostly in the distal small intestine. The greater width of the colon lumen reduces the possibility of colonic mechanical obstruction due to bezoars, although a few rare cases of colon obstruction have been reported in children.

Bezoar-induced intestinal obstructions usually occur 50-70 cm proximal to the ileocecal valve, because of the reduced lumen diameter towards the distal end, the lower motility in the distal small intestine, and the decreased motility of bezoars due to the increased water absorption at the distal end.

When surgical treatment is chosen, open or laparoscopic abdominal exploration may be performed. Laparoscopic exploration is currently used more frequently; however, it requires technical experience because of the presence of dilated intestinal segments. It also requires a good preoperative radiological study to localize the bezoar because there can be multiple bezoars and there are reports of cases requiring surgery for an unnoticed bezoar. The factors to be considered when selecting the laparoscopic method include the size and number of bezoars, the presence of complications (such as perforation and peritonitis), and previous abdominal operations. Laparoscopic interventions are being performed increasingly; however, open surgery is still the most common method used for the surgical treatment of bezoar-induced intestinal obstructions. Some bezoars, particularly bezoars composed of persimmon, can be more difficult to remove, requiring surgery.

After determining the need for surgical intervention, the issue of what kind of intervention should be performed arises. The decision to perform an enterotomy to remove bezoars varies with experience. Surgeons often use the milking technique, which is used to advance the intestinal contents manually either proximally or distally. However, a laceration in the intestinal serosa or mesentery can occur during this procedure. Aysan et al reported that rats undergoing milking developed significantly more peritoneal adhesions compared to the control group and that the peritoneal cultures were positive.

The bezoar location in the gastrointestinal system (duodenum, jejunum, or ileum) plays an important role in selecting the surgical method (Figure2).. Oh et al reported that an enterotomy was more successful for bezoars located in the proximal small intestine. For the patients with ischemia and perforation caused by bezoars, anastomosis or stoma procedures should be performed with segmental small bowel resection.

Outlook and prevention

Treatment of bezoars is largely successful. However, steps should be taken to prevent future occurrences.

Those at increased risk of developing a bezoar may wish to avoid certain foods such as persimmons, celery, pumpkin, prunes, and sunflower seed shells. Chewing food thoroughly before swallowing may also help to prevent their occurrence.

Psychiatric treatment, where appropriate, can help to prevent trichobezoars

CONCLUSION

In conclusion, the possibility of bezoars must be considered in patients with mechanical intestinal obstruction, although they are rare. This possibility must be considered especially in regions where there is excess consumption of high-fiber food, which causes bezoar formation, in patients with intestinal obstruction, and in patients who have a history of abdominal surgery for a peptic ulcer. Early preoperative contrast-enhanced CT assessment aids both the diagnosis and decision for early surgical treatment. Surgery is usually chosen for bezoars causing intestinal obstruction. In addition to the physical characteristics of the bezoar, its location should be considered when selecting the surgical procedure.

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