Small bowel obstruction due to phytobezoar: CT findings

Clinical History:

Heavy smoker, occasional alcohol consumer. Crampy diffuse abdominal pain and vomiting that started 24 hours ago.

Imaging Findings:

The patient presented at the emergency department complaining of a crampy diffuse abdominal pain and vomiting that started 24 hours ago. Physical examination revealed a markedly distended abdomen with generalized tenderness. Some bowel sounds were present at auscultation. He had a history of gastric surgery for peptic ulcer disease, 25 years ago, was a heavy smoker and an occasional alcohol consumer.

The differential diagnosis included mainly hollow viscus perforation, pancreatitis and intestinal obstruction.

Laboratory tests demonstrated urea and creatinine elevation, moderate increase of blood glucose and leukocytosis, while blood and urine amylase were at normal levels.

The PA chest X-ray showed no evidence of free intraperitoneal air. The plain abdominal X-ray series, which followed the administration of per os non-ionic contrast medium showed distended small bowel loops with air-fluid levels, and absence of air in the large intestine.

Ultrasound showed no evidence of pelvicalyceal dilatation and renal dysfunction was attributed to decreased volume state.

The patient was finally referred for an abdominal CT scan, which demonstrated a markedly distended stomach and small intestine until the middle part of the ileus. The large intestine was collapsed. At the transition zone between distended and collapsed bowel loops, there was a low-density inhomogeneous endoluminal ovoid mass measuring approximately 3 x 2.5 cm with air bubbles in it. Moreover, multiple filling defects 1.5-2 cm in diameter were recognized within the proximally dilated small bowel loops.

Surgery confirmed the diagnosis of a phytobezoar small bowel obstruction.

Discussion:

Small bowel obstruction accounts for 20% of all hospital admissions. The commonest causes are adhesions 60%, strangulated hernia 20%, malignancy 5%, volvulus 5%, inflammatory bowel disease 5% and other causes 2%. Early detection is very important as surgery within 36 hours reduces mortality to 8%.

Phytobezoars are a rare cause of intestinal obstruction accounting for only 0.4-4% of all intestinal obstructions. They are aggregates of inadequately digested food often containing a large amount of fiber residue. Risk factors for developing a phytobezoar are mainly a high fiber intake or vegetarian diet, inadequate mastication and gastric surgery. Diabetes is another cause as it disturbs normal gastrointestinal motility. Phytobezoars form initially in the stomach and pass subsequently to the small bowel where they become impacted usually at the level of ileum or distal jejunum. The result is usually complete mechanical small bowel obstruction.

Abdominal series have 75% sensitivity and 53% specificity in diagnosing small bowel obstruction. Dilated loops of
small bowel with air-fluid levels and absence of air in the colon indicate small bowel obstruction. However the exact site, cause and degree of obstruction are often not easy to be determined. Plain abdominal radiography suffers from pitfalls as it depends largely on the presence of air to demonstrate obstruction. This means that distended bowel loops, filled with fluid only, are hard to evaluate and nasogastric tubes often lessen the amount of present air. On the other hand a sentinel loop can mimic obstruction and ingested air can mimic proximal obstruction as well. When it comes to phytobezoars it is difficult to differentiate them from an abscess or simply feces within the colon.

Ultrasonography may exclude small bowel obstruction in 89% of patients and has 100% specificity in detecting it. Phytobezoars were detected with ultrasound in 88% of patients with small bowel obstruction in a retrospective study. Phytobezoars must be distinguished from gallstones as they have similar sonographic characteristics (a hyperechoic arc-like surface with acoustic shadow). Feces in the colon may mimic phytobezoars and their location may be distinguished mainly by the characteristic morphology of colonic haustra. The presence of multiple phytobezoars is difficult to evaluate with ultrasonography alone.

CT is becoming a first line examination for the evaluation of small bowel obstruction. It has 93% sensitivity and 100% specificity in diagnosing obstruction. It is the examination of choice for patients with signs of systemic toxicity. It can easily exclude other causes of acute abdomen, differentiate between simple obstruction and strangulation and detect signs of concomitant intestinal ischemia. It can accurately define the cause (endoluminal, mural, extraluminal), degree and level of obstruction. The presence of a transition zone between dilated and collapsed loops is distinctive of obstruction. Careful inspection of this zone leads to the cause of obstruction. In the case of phytobezoars the presence of a round or ovoid intraluminal mass with a "mottled gas" pattern is believed to be pathognomonic for some authors. This characteristic pattern is also referred to as "the small bowel feces" sign described in cases of severe stasis in patients with high grade small bowel obstruction. The substrate of the small bowel feces is poorly digested food with bacterial overgrowth. Delayed transit along with increased water absorption from the small bowel play a key role as well. Apart from phytobezoars the small bowel feces is seen mainly in mechanical obstruction by adhesions, hernias, tumors, inflammatory bowel disease, infection, ischemia, cystic fibrosis, metabolic intestinal disease and in patients with jejunostomy tubes. Presence of this sign without dilated loops (loop diameter < 2.5 cm) may indicate ileocecal valve incompetence. However the small bowel feces in patients with cystic fibrosis or high degree of small bowel obstruction tend to be more elongated, have less compact consistency than phytobezoars and are not located in the transition zone. Search for similar masses elsewhere within the gastrointestinal tract must be performed and findings reported because reintervention may be needed in up to 9% of patients due to residual phytobezoars. Small phytobezoars usually float on the air-fluid surface. Their detection is facilitated using modified window settings (L -100, W 350), instead of classic abdominal soft-tissue windows (L 40, W 350).Any signs of associated bowel ischemia must also be reported and are an indication for prompt surgical intervention. Surgery consists mainly in fragmentation and milking of the mass through the ileocecal valve into the large intestine. When this is impossible enterotomy or even bowel resection may be performed.

In conclusion, phytobezoars must be considered as a probable underlying cause in patients with a history of previous gastric surgery, who present with small bowel obstruction and CT can provide a quick and accurate diagnosis.

**Differential Diagnosis List:** Phytobezoar inducing mechanical small bowel obstruction

**Final Diagnosis:** Phytobezoar inducing mechanical small bowel obstruction

**References:**


Ripolles T, Garcia-Aguayo J, Martinez MJ, Gil P.
Gastrointestinal bezoars: sonographic and CT characteristics. 
Boudiaf M, Soyer P, Terem C, Pelage JP, Maissiat E, Rymer R.
CT evaluation of small bowel obstruction.
Fuchsjager MH.
The small-bowel feces sign.
Description: Supine abdominal X-ray: dilated small bowel loops, absence of air in the large intestine.
Origin:
Description: Upright abdominal X-ray: dilated small bowel loops with air-fluid levels and "string of pearls" and no evidence of air in the large intestine. Origin:
Figure 2

a

Description: Distended stomach. Origin:

b

Description: Ovoid mass 3 x 2.5 cm with "mottled gas pattern" in the transition zone between dilated and collapsed loops. Origin:
Description: Contiguous slice. Dilated small bowel loops with air-fluid levels and floating material on the air-fluid interface. Collapsed ascending and descending colon. Origin: