



Beyond Adhesions and Hernias: Rare Causes of Acute Small-Bowel Obstruction in Adults—Diagnostic Challenges and Surgical Management: A Case Series.

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Abstract

Background: Small-bowel obstruction (SBO) is one of the most common surgical emergencies. Although the vast majority of cases are due to postoperative adhesions and external hernias, rare causes can lead to significant diagnostic dilemma as they may acutely compromise bowel either by strangulation or metabolic derangement.

Case presentation: This case series describes five illustrative adult patients presenting with acute mechanical SBO due to an ileal phytobezoar, Meckel's diverticulum with mesodiverticular band, gallstone ileus, transmesenteric internal hernia and ileal gastrointestinal stromal tumour (GIST). While the patients had broadly similar obstructive symptoms, their underlying mechanisms differed widely. Contrast enhanced computed tomography (CECT) identified the transition point and bowel viability, however the exact etiology was not clear preoperatively in all cases. Diagnosis was made by surgical exploration and definitive treatment was performed.

Conclusion: Rare causes of SBO should be considered when usual etiologies are absent, particularly in patients with a virgin abdomen. CT interpretation should be systemic: closed-loop obstruction or ischemia should be either identified as a cause or an effect of the underlying reason for presentation to minimize bowel loss and morbidity and, judicious resuscitation followed by senior-led individualized surgery is crucial.

Keywords: small-bowel obstruction; phytobezoar; Meckel's diverticulum; gallstone ileus; internal hernia; gastrointestinal stromal tumour; emergency surgery.



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INTRODUCTION

Small-bowel obstruction (SBO) remains one of the most common causes of emergency admission for surgical intervention and can be due to a diverse variety of mechanical aetiologies. Typical symptoms include: colicky abdominal pain, vomiting, distension, and failure to pass stool or flatus. Despite postoperative adhesions being one of the most common etiologies of SBO, recent investigations into SBO with a virgin abdomen have stressed that other less common causes (such as malignancy, internal hernia, certain congenital defects) should nevertheless be retained within the differential diagnosis [1, 2].

Modern assessment relies heavily on CECT, which can confirm obstruction; localize the level and transition point of obstruction; provide differential mechanism diagnostic information; and document findings consistent with complications such as closed-loop obstruction, strangulation or ischemia [3]. The diagnostic issue is of particular importance when there is no history of prior abdominal surgery or where the radiological findings do not support a conventional adhesive or external hernia-related etiology.

Bezoars are uncommon intraluminal causes of SBO. Phytobezoars, composed largely of poorly digested vegetable material, may become impacted in the distal small bowel and produce complete obstruction. Recent reports continue to highlight the diagnostic value of CT and the importance of considering dietary and motility-related risk factors [4-6].

Meckel's diverticulum is an important congenital cause of unexplained SBO in adults. Obstruction may result from volvulus, intussusception, internal herniation, or entrapment beneath a mesodiverticular band, and preoperative diagnosis can remain difficult [7-9]. Gallstone ileus is another uncommon cause, occurring predominantly in older patients after migration of a gallstone through a bilioenteric fistula [10,11]. Internal hernias are rare but clinically important because of

their potential for rapid strangulation and bowel necrosis [12,13]. Small-bowel GISTs represent a further uncommon pathological substrate for obstruction and require oncologically appropriate management [14,15].

The present series illustrates five distinct mechanisms of adult SBO and highlights their clinical presentation, CT clues, operative findings, surgical decision-making, and outcomes.

MATERIALS AND METHODS

Five illustrative adult cases of acute mechanical SBO requiring operative intervention were assembled to demonstrate uncommon mechanisms of obstruction. The cases represent an ileal phytobezoar, Meckel's diverticulum associated with a mesodiverticular band, gallstone ileus, a transmesenteric internal hernia, and an ileal GIST. The study was done in Department of General surgery, ESIC and PGIMSR, Bengaluru.

Clinical presentation, laboratory findings, radiological findings, preoperative diagnosis, intraoperative findings, operative procedure, histopathology, postoperative course, and follow-up were considered. Initial management included intravenous fluid resuscitation, nasogastric decompression where indicated, correction of electrolyte abnormalities, analgesia, and perioperative antimicrobial prophylaxis. Haemodynamically stable patients underwent CECT.

Important: the numerical and patient-level information in this manuscript is synthetic/illustrative. It must not be represented as real patient data. Before journal submission, every demographic, investigation, imaging finding, operative detail, histopathology result, follow-up outcome, ethical approval statement, and consent statement must be replaced or verified against source clinical records.

CASE PRESENTATIONS

Case 1: Ileal Phytobezoar

A 58 y/o male presented with central colicky abdominal pain, bilious vomiting and increasing abdominal distension over three days. He had not been having bowel movements, nor passed flatus for about 24 hours. The only history was that of diabetes mellitus and there is no previous abdominal surgery. He had mild dehydration; his pulse was 102 beats/min and blood pressure was 118/74 mmHg. On examination, the abdomen was firm with exaggerated bowel sounds and mild midline tenderness without guarding or rigidity.

His laboratory evaluation at this time shows haemoglobin of 13.2 g/dL, total leukocyte count of 12,600/mm³ and serum creatinine of 1.1 mg/dL. Abdominal radiography revealed multiple air-fluid levels best visualized as central. Abdominal CT: CECT revealing dilated loops of jejunum and proximal ileum showing a transition point in distal ileum. At the site of transition, an echogenic ovoid intraluminal structure with mottled gas is noted, raising concern for a bezoar.

Undergoing resuscitative measures, there was an exploratory laparoscopy revealing a firm mass in the lumen approximately 60 cm proximal to the ileocecal junction. The mass could not be fragmented or milked distally in a safe manner; therefore, a limited enterotomy was performed and 5 × 4 cm phytobezoar was removed. The enterotomy was closed transversely. Bowel activity resumed on postoperative day 3, and the patient was discharged on day 6. Dietary review showed high-fibre fruit consumed but poorly masticated.

Case 2: Meckel's Diverticulum with Mesodiverticular Band

A previously fit and well 32 year-old man presented with sudden onset lower abdominal pain, vomiting and inability to pass flatus for approximately 18 hours. Pulse rate was 108 beats/min and the abdomen was mildly distended with tenderness best localized to the right lower quadrant. No external hernia was identified. The leukocyte count was 15,200/mm³ (neutrophilic predominance), and serum lactate was mildly elevated.

CECT showed a cluster of distended distal ileal loops with two transition points in close proximity, consistent with closed-loop obstruction. Derivation of a diagnosis was not made with high confidence: mild mesenteric edema and free fluid.

Emergency laparoscopy demonstrated around 25 cm of distal ileum incarcerated under a fibrous band from the tip of a Meckel's diverticulum to nearby mesentery. The bowel was distended and appeared congested prior to division of the band, rapidly regaining normal colour and peristalsis after release. Meckel's diverticulum was identified as a wide-based structure about 70 cm proximal to the ileocecal valve. Either segmental ileal resection with primary anastomosis. Histopathology showed features of a true diverticulum with focal ectopic gastric mucosa and no malignancy. Post-operative recovery was unremarkable and the patient was discharged on postoperative day 7.

Case 3: Gallstone Ileus

We report a 74-year-old woman with hypertension and known cholelithiasis, referring to hospital for intermittent abdominal pain and vomiting for four days. Clinical symptoms had become persistent over the preceding day. There was no previous abdominal surgery. On examination they were dehydrated, tachycardic, and had abdominal distension with generalised tenderness but no peritonism. Investigation showed leukocytosis, mild hypokalaemia, and prerenal azotemia. CECT demonstrated dilated small-bowel loops with a distal ileal transition point, an ectopic calcified intraluminal lesion of ~3.5 cm, pneumobilia and an abnormal gallbladder-duodenal fistula (Fig. 1), consistent with gallstone ileus.

The obstructing calculus was felt 40 cm proximal to the ileocecal valve at laparotomy. The bowel was viable. An enterolithotomy was performed, and a 3.5 × 3 cm calculus was extracted. Cholecystectomy and fistulotomy were not performed at the same time during the emergency because of patient age, comorbidity and lack of an active gallbladder sepsis. The transient postoperative ileus was conservatively treated and she was discharged on day 9.

Case 4: Transmesenteric Internal Hernia

Severe colicky abdominal pain, repeated vomiting and distention which progressed rapidly within 12 hours in a 41-year-old woman. Never had an abdominal surgery. She was tachycardic at 116 beats/min, while examination showed diffuse tenderness with localized periumbilical guarding. Leukocyte count was 17100/mm³ and serum lactate 3.1 mmol/L.

On imaging, CECT revealed a closed-loop SBO with abutting loops of small bowel, mesenteric vessel crowding, and a whirl sign. Lesion showed less enhancement of a small segment of the bowel - concern for evolving ischemia.

Acute laparotomy demonstrated 35 cm of ileum protruding through a congenital mesenteric defect. The majority of the bowel recovered after reduction and warming, but 12 cm was nonviable and resected with primary anastomosis. Mesenteric defect was IV closed. Histopathology showed transmural ischemic necrosis without malignancy or vasculitis. The patient was discharged on postoperative day 8.

Case 5: Ileal Gastrointestinal Stromal Tumour

A 55-year-old man reported recurrent abdominal discomfort and intermittent vomiting for two months, followed by acute distension, persistent vomiting, and obstipation for 36 hours. He also described an unintentional weight loss of approximately 4 kg over three months. Examination revealed abdominal distension and mild tenderness without a palpable mass. Haemoglobin was 10.8 g/dL and leukocyte count 11,900/mm³.

CECT demonstrated mechanical SBO with a mid-ileal transition point associated with an approximately 4.5-cm enhancing exophytic bowel-wall lesion. No distant metastasis was evident.

At exploration, a well-defined exophytic tumour arising from the ileum was identified approximately 100 cm proximal to the ileocecal valve, producing angulation and narrowing of the bowel. Segmental resection with grossly clear margins and primary anastomosis was performed without tumour rupture. Histopathology showed a spindle-cell GIST, with immunohistochemical positivity for CD117 and DOG1. Recovery was uncomplicated, and the patient was referred for formal oncological risk assessment and consideration of further therapy.

DISCUSSION

The five cases demonstrate the heterogeneous pathology that may underlie a clinically similar presentation of acute SBO. Although pain, vomiting, distension, and obstipation were recurring features, the mechanisms ranged from intraluminal obstruction and congenital bands to biliary-enteric disease, internal herniation, and neoplasia. In patients with a virgin abdomen, contemporary evidence supports a broad diagnostic approach rather than assuming that the absence of previous surgery excludes a mechanical process requiring operation [1,2].

CECT is central to the evaluation of adult SBO because it can identify the transition point, estimate the grade of obstruction, suggest an etiology, and identify features that raise concern for ischemia or strangulation. Recent systematic evidence continues to support CT as the key cross-sectional modality in this setting [3]. Nevertheless, radiological findings should be interpreted alongside the patient's physiology. Persistent severe pain, tachycardia, localized guarding, leukocytosis, metabolic derangement, or rising lactate should lower the threshold for operative exploration when compromised bowel is suspected.

The first case illustrates phytobezoar-induced SBO. Recent publications continue to describe phytobezoars as unusual but important intraluminal causes of obstruction [4-6]. Predisposing factors can include previous gastric surgery, altered motility, impaired mastication, and high-fibre dietary exposure. CT may reveal a well-defined intraluminal mass with internal gas at the transition point. When an obstructing bezoar cannot be safely fragmented or milked distally, enterotomy

and extraction provide definitive treatment; bowel resection is reserved for ischemia, perforation, or associated pathology [4-6].

The second case illustrates Meckel's diverticulum as a vital differential diagnosis in younger adults with adventitious SBO. Modern case-based literature shows that in adults, Meckel's diverticulum can lead to acute obstruction by volvulus, intussusception, adhesions or a mesodiverticular band [7–9]. An aperture created by a mesodiverticular band can lead to incarceration of adjacent ileum forming a closed-loop with possible vascular compromise. Recent reports also show that laparoscopic approach might actually be performed in selected stable patients with adequate expertise once intraoperative conditions allowed [8].

Gallstone ileus, the last case listed, is a rare but significant contributor to mechanical SBO in elderly patients [10,11]. It usually occurs after the creation of a biliobiliary fistula, commonly cholecystoduodenal fistula, allowing a large stone to pass into the intestine. Typical sites of impaction include the distal ileum. CT can show obstructing ectopic calculus, pneumobilia / bowel obstruction, and sometimes the fistulous track. Individualized operative treatment continues to be supported in the literature. In older or physiologically compromised patients, enterolithotomy alone may be sufficient while one-stage procedure combines cholecystectomy and fistula closure is more extensive and reserved for selected patients [10,11].

Fourth case: highlights 'the risk of internal hernia. Internal hernias are unusual but can rapidly result in closed-loop obstruction, strangulation and necrosis. A clinical experience over 13 years has been recently reported as emphasizing the challenge of pre-operative diagnosis, and indicating the necessity for increased awareness [12]. Recent adult case reports of transmesenteric hernia similarly stress the need for urgent surgical intervention when there is upper gastrointestinal closed-loop obstruction or vascular compromise [13]. CT hints: (1) clustered loops, (2) abnormal mesenteric vessel orientation, (3) vascular crowding, (4) edema and (5) whorl configuration. The definitive management consists of reduction, assessment of viability, resection when indicated and closure of defect.

The fifth case is of an obstructing ileal GIST. GISTs are mesenchymal neoplasms with variable malignancy potential. Although exophytic growth of many small-intestinal GIST makes complete luminal obstruction not their most common clinical presentation, obstruction may occur due to taut or angulated bowel or secondary to distortion by the mass as well as intussusception. The present international guidance is directed toward a radical resection of localized disease and emphasizes avoiding tumor rupture at a pathologically appropriate risk-stratified level along with molecular profiling [14,15]. Tumour size, mitotic activity and location as well as the rupture status impact recurrence risk and second treatment decision (adjuvant therapy).

Several practical lessons emerge. First, the transition point on CT should be examined systematically: the lumen for a bezoar or ectopic gallstone, the bowel wall for tumour or inflammatory disease, and the mesentery for bands, internal herniation, twisting, and vascular compromise. Second, establishing whether the obstruction is complicated by strangulation is often more urgent than determining the exact etiology. Third, operative strategy must be individualized. Enterotomy may suffice for a bezoar; Meckel-related obstruction may require division of a band with diverticular or segmental resection; gallstone ileus may be treated by enterolithotomy in selected patients; strangulated internal hernia requires urgent reduction and selective resection; and obstructing GIST requires oncologically appropriate resection.

These cases also underline the value of correlating clinical, radiological, and operative findings. Rare causes may not be recognized with certainty before surgery, and operative exploration remains both diagnostic and therapeutic when imaging is equivocal or signs of bowel compromise are present.

CONCLUSION

Rare etiologies of SBO should remain within the differential diagnosis when conventional causes are absent, particularly in patients with a virgin abdomen. Phytobezoars, complicated Meckel's diverticulum, gallstone ileus, internal hernias, and small-bowel GISTs can produce similar clinical presentations despite markedly different mechanisms. CECT is invaluable for identifying the transition point and detecting closed-loop obstruction or ischemia, but operative exploration may remain necessary when the diagnosis is uncertain or complicated obstruction is suspected. Prompt resuscitation, careful imaging interpretation, and timely pathology-specific surgical management are central to preserving bowel viability and achieving favourable outcomes [1-3,12-15].

Key Learning Points

- A virgin abdomen with SBO should prompt active evaluation for uncommon mechanical causes.
- CT assessment should focus on the transition point, bowel wall, lumen, mesentery, and signs of vascular compromise.

- Closed-loop obstruction and suspected ischemia warrant urgent surgical assessment regardless of whether the exact etiology is known.
- Meckel's diverticulum and internal hernia are important considerations in unexplained obstruction in younger adults.
- Gallstone ileus should be considered particularly in older patients with SBO, pneumobilia, and an ectopic calculus.
- Recurrent obstructive symptoms with anaemia or weight loss should raise suspicion for small-bowel neoplasia.
- Operative management should be tailored to the pathology, bowel viability, patient physiology, and oncological principles.

Declarations

Ethical approval: To be completed according to institutional requirements after replacement of the illustrative cases with actual patient data.

Consent for publication: Written informed consent should be obtained from each patient for publication of clinical information and clinical/radiological/operative images, where applicable.

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