

Isolated Ileal Volvulus in a Patient Without Previous Abdominal Surgery: A Rare Cause of Small Bowel Obstruction

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Abstract

Primary isolated ileal volvulus is an exceptionally rare cause of mechanical small bowel obstruction (SBO) in adults, particularly in patients without prior abdominal surgery or other predisposing conditions. Delayed diagnosis may result in bowel ischemia and increased morbidity. Contrast-enhanced computed tomography (CT) plays a pivotal role in establishing an early diagnosis and assessing bowel viability.

A 60-year-old man with no history of abdominal surgery presented with diffuse abdominal pain, progressive abdominal distension, and obstipation for five days. Contrast-enhanced CT demonstrated marked proximal small bowel dilatation, an abrupt transition point at the terminal ileum, the characteristic whirlpool sign of twisted mesenteric vessels, and segmental pneumatosis intestinalis. Emergency exploratory laparotomy confirmed isolated clockwise volvulus involving a 30-cm segment of the terminal ileum without bowel ischemia or necrosis. Simple detorsion restored normal bowel perfusion, eliminating the need for bowel resection. The postoperative course was uneventful.

This case highlights the crucial role of contrast-enhanced CT in the early diagnosis of isolated ileal volvulus and demonstrates that pneumatosis intestinalis should not be regarded as an isolated marker of irreversible bowel ischemia. Careful correlation of imaging findings with the clinical presentation, laboratory results, and intraoperative assessment may permit bowel-preserving surgery in selected patients.

Keywords: Isolated Ileal Volvulus; Mechanical Small Bowel Obstruction; Computed Tomography; Whirlpool Sign; Pneumatosis Intestinalis; Bowel Viability

Introduction

Small bowel volvulus (SBV) is an uncommon but potentially life-threatening cause of mechanical small bowel obstruction in adults. Delayed diagnosis may rapidly lead to bowel ischemia, necrosis, perforation, and increased mortality. Most cases are secondary to postoperative adhesions, congenital malrotation, internal hernias, abdominal masses, or other predisposing anatomical abnormalities [1-4].

Primary or isolated SBV, defined as torsion of the bowel and its mesentery in the absence of an identifiable underlying cause, is exceptionally rare in adults, particularly when involving the terminal ileum [1-3]. Although the exact pathophysiological mechanism remains unclear, excessive bowel mobility associated with a long mesentery and a narrow mesenteric root has been proposed as a major

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predisposing factor. Owing to its rarity and nonspecific clinical presentation, the diagnosis is frequently delayed or initially mistaken for other causes of acute small bowel obstruction [2-4].

Contrast-enhanced computed tomography (CT) has become the imaging modality of choice for the diagnosis of SBV. Characteristic imaging findings—including the whirlpool sign, an abrupt transition point, abnormal positioning of the bowel loops, and signs of bowel ischemia—allow not only early diagnosis but also assessment of bowel viability, thereby facilitating timely surgical management [4-7].

Pneumatosis intestinalis is traditionally considered an imaging finding suggestive of bowel ischemia in the appropriate clinical setting. However, increasing evidence indicates that it may also occur in the absence of transmural necrosis, particularly in patients with mechanical bowel obstruction, emphasizing the need for careful interpretation in conjunction with clinical, laboratory, and imaging findings [5-8].

We report a rare case of isolated terminal ileal volvulus associated with pneumatosis intestinalis in a patient without prior abdominal surgery. Despite the presence of intramural gas on CT, emergency surgery confirmed preserved bowel viability, allowing successful treatment by simple detorsion without bowel resection. This case highlights the importance of integrating imaging findings with intraoperative assessment to optimize surgical decision-making and avoid unnecessary bowel resection.

Case Report

A 60-year-old man with no history of previous abdominal surgery presented to the emergency department with a 5-day history of diffuse abdominal pain, progressive abdominal distension, and obstipation. He denied nausea, vomiting, or fever. Physical examination revealed a markedly distended and tympanic abdomen without localized tenderness, guarding, or signs of peritonitis. The patient was hemodynamically stable.

Initial laboratory investigations showed a hemoglobin level of 13 g/dL, a normal white blood cell count, a C-reactive protein level of < 5 mg/L, and a serum lactate concentration of 1.4 mmol/L, with no biochemical evidence of bowel ischemia.

Contrast-enhanced computed tomography (CT) of the abdomen and pelvis demonstrated marked dilatation of the proximal small bowel loops with an abrupt transition point at the terminal ileum. Twisting of the mesenteric vessels and surrounding mesenteric fat produced the characteristic whirlpool sign in the right lower quadrant (Figure 1). Focal intramural gas within the terminal ileal wall was consistent with pneumatosis intestinalis (Figure 2).

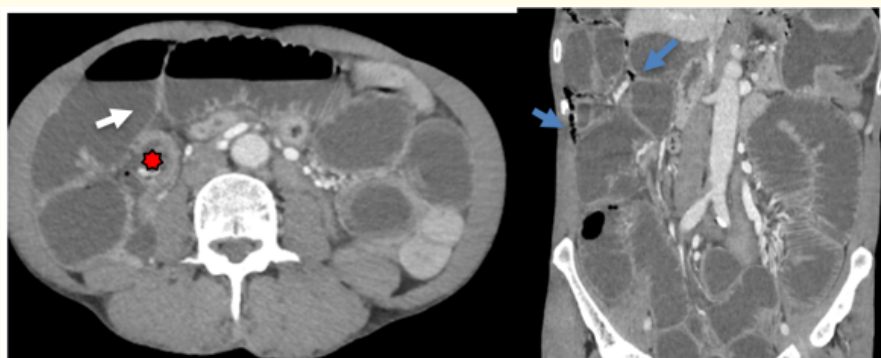


Figure 1: Axial and coronal contrast-enhanced CT—abrupt transition at terminal ileum.

Axial CT shows massively distended proximal small bowel (White arrow) with an abrupt caliber change at the terminal ileum (Asterisk), indicating the obstruction point. Focal intramural gas within the wall of the small bowel, consistent with pneumatosis intestinalis (Blue arrows). The colon is collapsed.

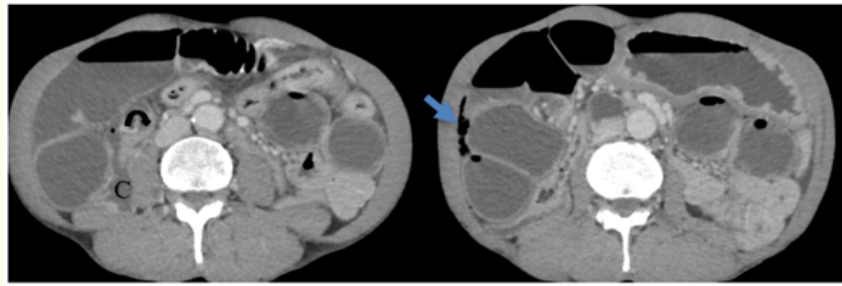


Figure 2: Axial CT reformation - mesenteric whirlpool sign.

Axial CT showing swirling mesenteric vessels (Curved arrow), indicative of the whirlpool sign of volvulus. Collapsed cecum labeled "C".

The distal colon was collapsed, and there was no evidence of pneumoperitoneum, portal venous gas, significant ascites, or mesenteric vascular occlusion. Overall, the CT findings were highly suggestive of isolated terminal ileal volvulus without definite evidence of irreversible bowel ischemia.

Based on these imaging findings, the patient underwent emergency exploratory laparotomy. Intraoperatively, a 30-cm segment of the terminal ileum was found to be twisted clockwise around its mesenteric axis (Figure 3). The involved bowel was markedly distended but remained viable, with preserved color, mesenteric pulsations, and no evidence of transmural ischemia or necrosis. Following simple detorsion, bowel perfusion returned promptly to normal. Multiple subserosal gas-filled cystic lesions corresponding to pneumatosis intestinalis were observed along the affected bowel segment (Figure 4). No mesenteric defect, congenital malrotation, internal hernia, or other anatomical abnormality was identified. Consequently, neither bowel resection nor bowel fixation was considered necessary.

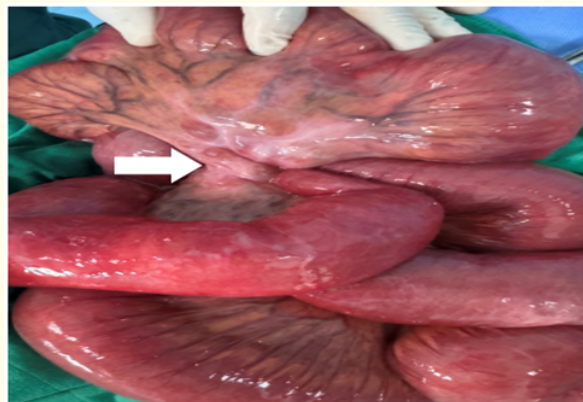


Figure 3: Intraoperative photo.

Twisted segment of terminal ileum (white arrow), distended but viable.

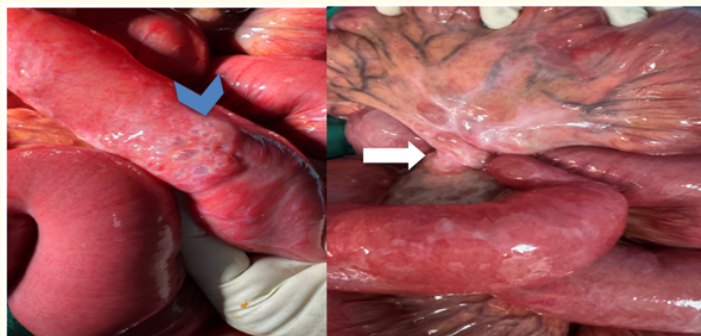


Figure 4: Intraoperative close-up.

Multiple subserosal gas-filled blebs (arrowheads) on the ileal wall, consistent with pneumatosis intestinalis without necrosis.

The postoperative course was uneventful. Oral feeding was gradually resumed after recovery of bowel function, and the patient was discharged in good clinical condition without postoperative complications.

Discussion

Primary isolated ileal volvulus is an exceptionally rare cause of mechanical small bowel obstruction in adults and remains a considerable diagnostic challenge, particularly in patients without previous abdominal surgery or any identifiable predisposing condition [1-3]. Unlike secondary small bowel volvulus, which is commonly associated with postoperative adhesions, congenital malrotation, internal hernias, or intra-abdominal masses, primary ileal volvulus occurs in the absence of an underlying anatomical lesion. Although its exact pathogenesis remains poorly understood, several mechanisms have been proposed, including excessive mobility of the terminal ileum related to a long mesentery with a narrow root, sudden changes in bowel motility, and abrupt postprandial bowel distension, all of which may promote spontaneous axial rotation of the bowel around its mesenteric pedicle [1-4].

Because its clinical manifestations are nonspecific, preoperative diagnosis is frequently delayed. Patients usually present with symptoms indistinguishable from other causes of mechanical small bowel obstruction, including abdominal pain, abdominal distension, vomiting, and obstipation. Likewise, laboratory findings may remain normal during the early stages of the disease, even in the presence of volvulus. Consequently, imaging plays a pivotal role in establishing an early diagnosis and expediting surgical management before irreversible bowel injury develops [2-4].

Contrast-enhanced CT is the imaging modality of choice for diagnosing small bowel volvulus because it simultaneously establishes the diagnosis, identifies the transition point, and evaluates bowel viability [4,5]. The whirlpool sign, corresponding to twisting of the mesenteric vessels and surrounding mesenteric fat around the vascular pedicle, is the most characteristic CT feature and strongly supports the diagnosis when associated with proximal small bowel dilatation and an abrupt transition point [4,5]. However, CT interpretation should extend beyond identifying the volvulus itself. Careful assessment of bowel wall enhancement, mural thickening, mesenteric edema, ascites, portomesenteric venous gas, and vascular compromise is essential for predicting bowel ischemia and guiding surgical decision-making.

One of the most remarkable findings in our patient was the presence of pneumatosis intestinalis despite complete preservation of bowel viability at surgery. Pneumatosis intestinalis represents an imaging sign rather than a diagnosis and encompasses a broad spectrum of benign and life-threatening conditions [6-8]. In the setting of mechanical bowel obstruction, increased intraluminal pressure may lead

to mucosal disruption and intramural gas without irreversible vascular compromise. Therefore, pneumatosis intestinalis should never be interpreted in isolation. Instead, its significance should always be assessed in conjunction with the patient's clinical status, laboratory findings, and associated CT features. The coexistence of absent mural enhancement, portomesenteric venous gas, elevated serum lactate, or diffuse peritonitis strongly suggests transmural bowel infarction, whereas isolated pneumatosis with preserved mural enhancement and stable clinical findings may represent a reversible condition [6-9].

The management of isolated ileal volvulus is primarily determined by intraoperative assessment of bowel viability. Bowel resection remains mandatory in the presence of irreversible ischemia or necrosis. Conversely, when bowel viability is preserved, simple detorsion is an appropriate and bowel-preserving treatment that avoids unnecessary intestinal resection and its associated morbidity [2,10]. Preservation of bowel length is particularly desirable whenever feasible, as unnecessary resection may expose patients to both short-term postoperative complications and long-term functional consequences. In our patient, immediate restoration of bowel perfusion after detorsion confirmed bowel viability and justified a conservative surgical approach.

This case also underscores the importance of close collaboration between radiologists and surgeons in the management of acute small bowel obstruction. Accurate interpretation of CT findings allows timely surgical intervention while preventing overestimation of bowel ischemia based solely on the presence of pneumatosis intestinalis. To our knowledge, reports describing isolated terminal ileal volvulus associated with pneumatosis intestinalis but successfully managed by simple detorsion without bowel resection remain exceedingly uncommon, highlighting the educational value of the present case [9,11].

Conclusion

Isolated ileal volvulus is a rare but important cause of mechanical small bowel obstruction that should be considered even in patients without previous abdominal surgery or other predisposing conditions. Contrast-enhanced computed tomography plays a pivotal role in establishing an early diagnosis by demonstrating characteristic findings such as the whirlpool sign, identifying the transition point, and assessing bowel viability. This case further illustrates that pneumatosis intestinalis should not be regarded as an isolated marker of irreversible bowel ischemia. When interpreted in conjunction with clinical findings, laboratory results, and intraoperative assessment, it may represent a reversible phenomenon, allowing successful bowel-preserving management through simple detorsion.

Patient Consent

Written informed consent was obtained from the patient for publication of this case report and the accompanying radiological images.

Conflict of Interest

The authors declare that they have no conflicts of interest related to this publication.

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