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Case Report

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Silent Strangulation: Closed-Loop Small Bowel Obstruction with Preserved Enhancement and Minimal Clinical Symptoms

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ABSTRACT

Closed-loop small bowel obstruction is a surgical emergency associated with a high risk of strangulation and bowel ischemia. Clinical presentation may be deceptively mild, and imaging findings can be subtle, leading to delayed diagnosis. We report a case of closed-loop mid-ileal obstruction with progressive free intraperitoneal fluid and preserved bowel wall enhancement on contrast-enhanced computed tomography. Despite minimal clinical symptoms and transient pain relief, surgical exploration revealed gangrenous bowel requiring resection. This case highlights the importance of recognizing free intraperitoneal fluid as a critical indirect imaging marker of bowel ischemia and emphasizes the need for early surgical intervention based on radiological suspicion rather than clinical severity alone.

Introduction

Small bowel obstruction is a common cause of acute abdomen. Among its subtypes, closed-loop obstruction carries a particularly high risk of strangulation, ischemia, and bowel necrosis [1]. Early diagnosis is crucial; however, clinical features may be nonspecific, and contrast-enhanced CT findings may not always demonstrate definitive signs of infarction [2]. This case illustrates a radiologic–clinical dissociation in closed-loop small bowel obstruction and underscores the diagnostic significance of increasing free intraperitoneal fluid.

Case Presentation

A middle-aged female patient presented with abdominal pain. Initial ultrasonography revealed a dilated segment of small bowel loops with mild free intraperitoneal fluid. The patient was clinically stable and was kept under overnight observation.

Follow-up ultrasonography the next day demonstrated an increase in the number of dilated small bowel loops along with a notable increase in free intraperitoneal fluid. Interestingly, the patient reported mild relief of pain and did not appear clinically toxic.

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Given the progressive imaging findings, a contrast-enhanced CT of the abdomen was performed for further evaluation.

Contrast-enhanced CT demonstrated a closed-loop obstruction involving the mid-ileal loops, arranged in a U-shaped configuration with stretched and converging mesenteric vessels (Figure 1). The involved bowel loops were markedly dilated (Figure 2). Moderate free intraperitoneal fluid was present (Figure 3).



Fig. 1. (a): Coronal contrast enhanced image shows a closed loop obstruction involving the mid ileal loop arranged in a U-shaped configuration with preserved bowel enhancement, (b) transition point (blue arrow) with both loops converging at this point with converging mesenteric vessels

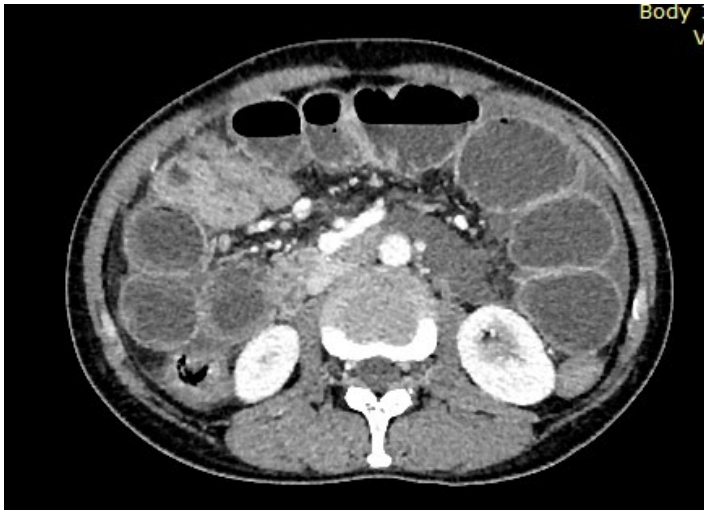


Fig. 2. Small bowel loops are markedly dilated



Fig. 3. (a) Axial imag e in lower abdomen shows free fluid in right paracolic gutter (b) Axial image upper abdomen shows free fluid in perihepatic and perisplenic location

Bowel wall enhancement appeared relatively preserved (Figure 1a). No pneumatosis intestinalis, portal venous gas, or free intraperitoneal air was identified. Despite the absence of classical CT signs of bowel infarction, the closed-loop configuration with progressive free fluid raised concern for evolving ischemia.

In addition, the duodenum was noted not to cross the midline, with abnormal position of the duodenojejunal junction, suggestive of intestinal malrotation (Figure 4).

The uterus demonstrated a bicornuate morphology, with two symmetric uterine horns and a deep fundal cleft, consistent with a bicornuate uterus (Figure 5).

Based on the imaging findings suggestive of closed-loop obstruction with suspected strangulation, the patient was taken for emergency exploratory laparotomy despite the relatively mild clinical symptoms.

Intraoperatively, a closed-loop obstruction of the mid-ileum caused by a fibrous band was identified. The involved bowel segment was gangrenous, with loss of peristalsis and discoloration (Figure 6). Moderate hemorrhagic peritoneal fluid was present (Figure 6).

Resection of the non-viable bowel segment was performed, followed by primary end-to-end anastomosis. The postoperative period was uneventful.

Discussion

Closed-loop small bowel obstruction results in early venous outflow compromise, leading to bowel wall



Fig. 4. Axial image showing duodenum not seen crossing the midline suggestive of intestinal malrotation

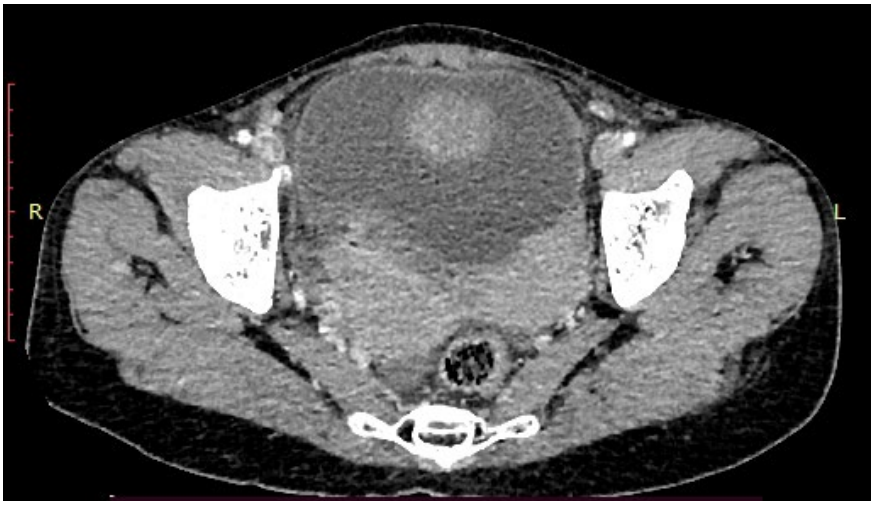


Fig. 5. Axial image of pelvis showing bicornuate morphology of the uterus

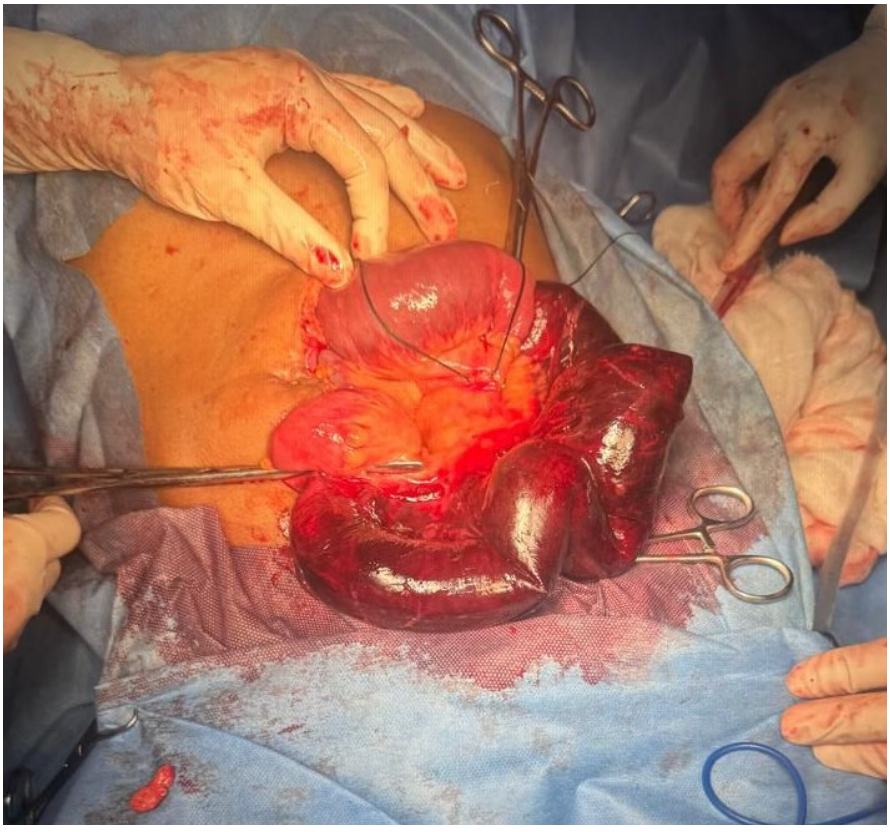


Fig. 6. Intraoperative image showing a closed-loop obstruction of the mid-ileum caused by a fibrous band was identified. The involved bowel segment was gangrenous with loss of peristalsis and discoloration

edema, hemorrhage, and transudation of fluid into the peritoneal cavity. Consequently, free intraperitoneal fluid serves as an important indirect marker of bowel ischemia [1].

Preserved bowel wall enhancement on contrast-enhanced CT does not reliably exclude ischemia. This may result from pseudo-enhancement due to intramural hemorrhage, reactive hyperemia, or venous-phase ischemia, particularly when non-contrast images are unavailable for comparison [2].

A notable feature in this case was the discrepancy between clinical presentation and disease severity. Transient pain relief may occur due to loss of sensory innervation in necrotic bowel, leading to misleading clinical improvement. This highlights the importance of prioritizing imaging findings over clinical symptoms in suspected strangulated obstruction.

Associated congenital anomalies included intestinal malrotation, evidenced by failure of the duodenum to cross the midline, and a bicornuate uterus, representing a Müllerian duct anomaly. These findings suggest an underlying embryological developmental defect.

Intraoperatively, a fibrous congenital band causing closed-loop obstruction with gangrenous bowel was identified. Such bands are commonly associated with malrotation and may remain asymptomatic until adulthood [3-5].

This case highlights that congenital bands often coexist with other developmental anomalies, favoring a congenital etiology over an acquired cause of obstruction.

Learning Points

- Closed-loop small bowel obstruction is a surgical emergency, even when clinical symptoms are mild.
- Free intraperitoneal fluid is a key indirect imaging marker of bowel ischemia in small bowel obstruction.
- Preserved bowel wall enhancement on contrast-enhanced CT does not exclude ischemia.
- Progressive increase in free fluid on serial imaging is highly suggestive of strangulation.
- Apparent clinical improvement may reflect bowel necrosis rather than true resolution.
- Early surgical intervention based on imaging suspicion reduces morbidity and mortality.

- Closed-loop obstruction due to congenital bands should prompt evaluation for associated anomalies such as intestinal malrotation and Müllerian duct anomalies, indicating a common developmental origin rather than an acquired cause.

Conclusion

Increasing free intraperitoneal fluid in the setting of closed-loop small bowel obstruction should raise strong suspicion for bowel ischemia, even when bowel wall enhancement appears preserved and clinical symptoms are minimal. Radiologic vigilance and early surgical intervention are critical to prevent adverse outcomes.

The coexistence of intestinal malrotation, bicornuate uterus, and congenital bands suggests a shared embryological origin, emphasizing that congenital bands should be considered part of a spectrum of developmental anomalies rather than an isolated finding.

Early recognition of such associations can aid in accurate diagnosis, guide surgical management, and improve patient outcomes.

Ethical Considerations

Compliance with ethical guidelines

There were no ethical considerations to be considered in this article.

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Conflict of Interests

The authors have no conflict of interest to declare.

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