

CASE REPORT

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# Closed bowel loop obstruction by a fibrous band mimicking paraduodenal hernia

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## Abstract

**Background** A closed-loop obstruction occurs when a section of the intestine becomes blocked at two locations along its pathway, increasing the likelihood of volvulus and ischemia. Frequently, a single adhesive band is the primary cause of a closed loop, although internal hernias from congenital defects or iatrogenic intervention in the mesentery or omentum can also become other factors. In closed-loop obstruction, computed tomography (CT) often displays a distinctive pattern where the bowel appears dilated and filled with fluid, forming a 'C-shaped' configuration.

**Case presentation** A 43-year-old female patient presented to the emergency department complaining of acute abdominal pain and repeated bilious vomiting with no history of absolute constipation. By examination, there were tenderness, guarding and rigidity. Her medical history includes type 1 diabetes since the age of 9 years and her surgical history included a onetime cesarean section and negative history of laparoscopic interventions. Ultrasound was done as a first-line investigation. It showed a few dilated bowel loops in addition to moderate intraperitoneal free fluid and could not detect the cause of bowel dilatation; therefore, non-contrast CT scan was requested and revealed the following findings: Two bowel loops exhibited distension and mucosal edema, and the configuration of bowel loops resembled a distinctive C-shape.

**Conclusion** Distinguishing between adhesive small bowel obstruction (SBO) and paraduodenal hernia relies on clinical history, imaging features, and risk factors. Adhesive SBO often stems from prior surgery or inflammation and may exhibit 'beak' or 'whorl' signs on CT scans.

**Keywords** Closed-loop obstruction, Fibrous band, Paraduodenal hernia, Small bowel obstruction

## Background

A closed-loop obstruction occurs when a section of the intestine becomes blocked at two locations along its pathway. This leads to a gradual accumulation of fluid and gas within the squeezed loop, increasing the likelihood of volvulus and ischemia [1, 2]. Frequently, a single adhesive band is the primary cause of a closed loop, although internal hernias from congenital defects or iatrogenic intervention in the mesentery or omentum can also become other factors. For instance, patients

who have undergone Roux-en-Y gastric bypass are at increased risk due to the surgically induced defects in the mesentery [3, 4].

Symptoms indicating small bowel obstruction (SBO) include abdominal pain characterized by cramps, abdominal swelling, emesis, and altered bowel sounds, which can be high-pitched or entirely absent [5].

In closed-loop obstruction, computed tomography (CT) often displays a distinctive pattern where the bowel appears dilated and filled with fluid, forming a 'C-shaped' configuration. Additionally, CT scans may show mesenteric vessels twisted and converging toward the obstruction site. Distinctive signs such as the 'bird's beak sign' indicating narrowing of the bowel at the obstruction point, or the 'whorl sign' indicative of the bowel rotation, may also be evident in the imaging [6].

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Left paraduodenal hernias (LPDHs) involve the entrapment of the small intestine within the uncommon congenital peritoneal fossa located behind the descending mesocolon, known as the Landzert fossa [7]. A distinctive CT feature of LPDHs is the presence of a well-defined cluster of frequently dilated bowel loops with a sac-like appearance, which is not seen in this case, typically located in the left upper quadrant at the level of the anterior pararenal space [6].

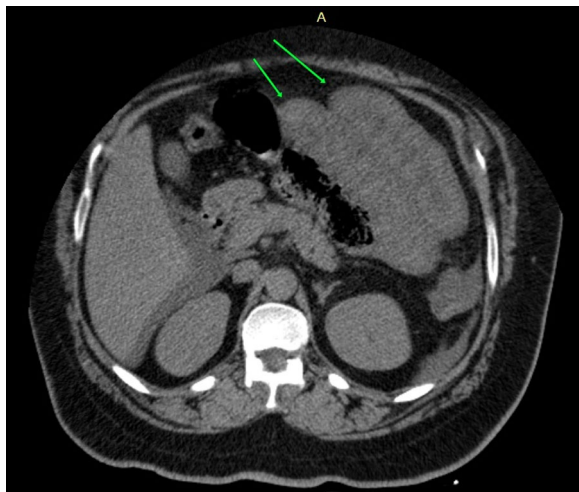
Immediate surgery is recommended for small bowel obstructions caused by adhesive bands, given the substantial risk of strangulation that can be life threatening, which can increase over time [2].

### Case presentation

A 43-year-old female patient presented to the emergency department complaining of acute abdominal pain and repeated bilious vomiting with no history of absolute constipation. By examination, there were tenderness, guarding and rigidity, her blood analysis revealed hypokalemia and high creatinine level (2 mg/dl). Her medical history includes type 1 diabetes since the age of 9 years and the surgical history included a onetime cesarean section 3 years ago with absence of post-operative complications and negative history of laparoscopic interventions.

### Imaging findings

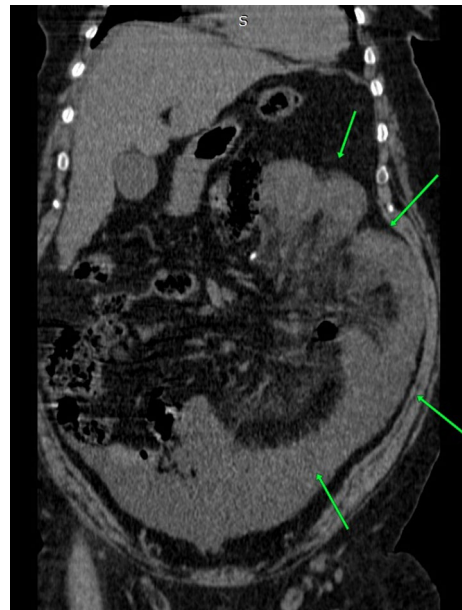
Ultrasound was done as a first-line investigation. It showed a few dilated bowel loops in addition to moderate intraperitoneal free fluid and could not detect the cause of bowel dilatation; therefore, non-contrast CT scan was requested and revealed the following findings:



**Fig. 1** Non-contrast CT scan axial view showing dilated bowel loops with marked mucosal thickening of their walls in addition to hepatorenal and subhepatic free fluid

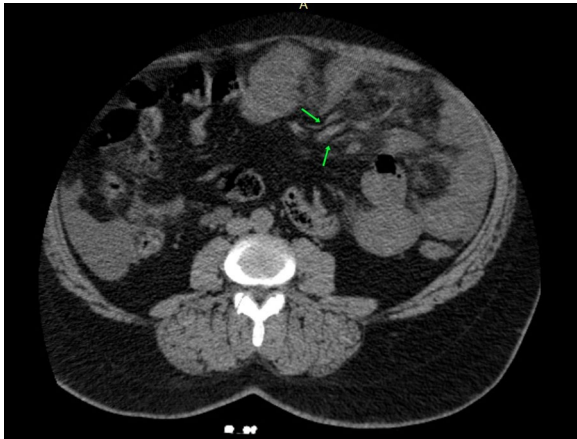


**Fig. 2** Non-contrast CT scan axial view showing C-shaped loop of bowel in axial cut section

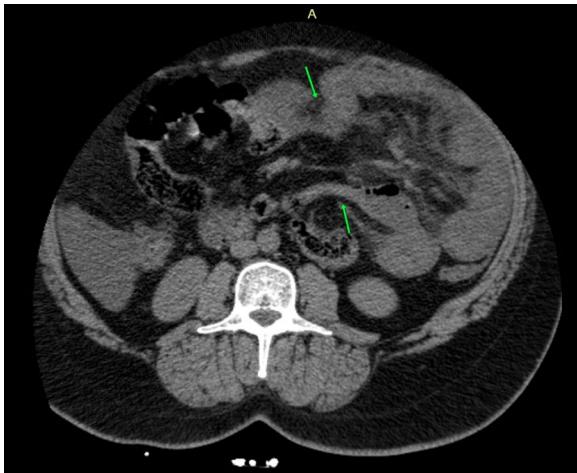


**Fig. 3** Non-contrast CT scan coronal view showing C-shaped loop of bowel in the coronal cut section

- (1) Two bowel loops exhibited distension and thickened mucosal wall, characteristic of obstructive pathology (Fig. 1).
- (2) The configuration of bowel loops resembled a distinctive C-shape, indicating abrupt transitions at both ends of the obstruction with absence of the known finding of sac-like appearance (Figs. 2 and 3).
- (3) Stretched mesenteric vessels converged toward the hernial orifice (Fig. 4).
- (4) A fusiform tapering was observed at the hernial orifice, confirming compression of the herniated bowel



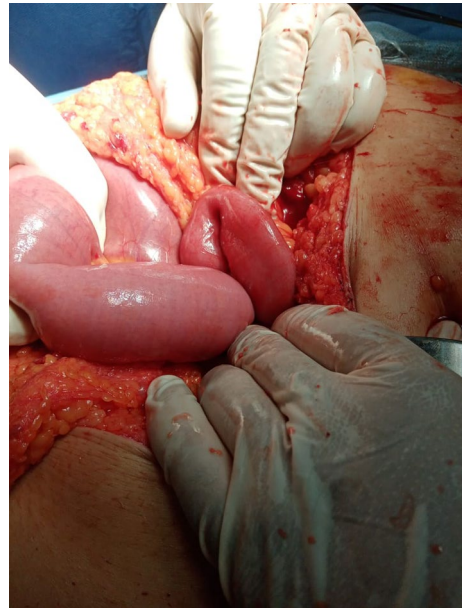
**Fig. 4** Non-contrast CT scan axial view showing converged and stretched mesenteric vessels



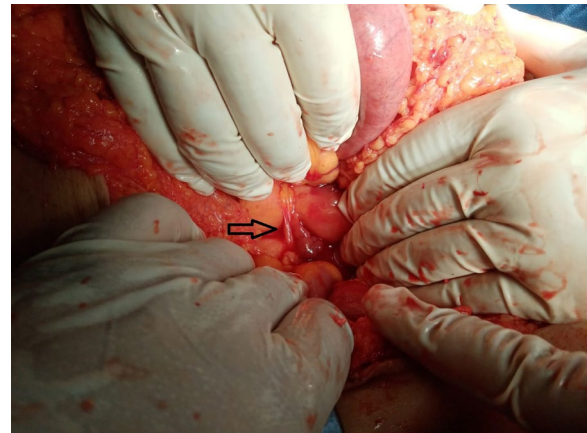
**Fig. 5** Non-contrast CT scan axial view showing the site of the adhesive band

segment passing through the fibrotic band creating the classic bird's beak sign (Fig. 5).

Among the differential diagnosis small bowel obstruction complicated by volvulus or left paraduodenal hernia, findings were consistent with closed-loop obstruction. However, a final diagnosis was confirmed post operatively as a herniation through a fibrotic band. The patient has undergone a laparotomy within one hour from the time the CT scan was done. Edematous bowel loops were found during the operation with absence of gangrene, and the obstruction was successfully relieved. (Figs. 6 and 7).



**Fig. 6** Intra-operative photograph showing C-shaped dilated bowel loop



**Fig. 7** Intra-operative photograph showing the adhesive fibrotic band

Our case has a limitation that is the absence of contrast examination due to the high creatinine level.

### Conclusion

Distinguishing between adhesive small bowel obstruction (SBO) and paraduodenal hernia relies on clinical history, imaging features, and risk factors. Adhesive SBO often stems from prior surgery or inflammation and may exhibit 'beak' or 'whorl' signs on CT scans. Paraduodenal

hernias are typically congenital and involve sac-like clusters of dilated bowel loops.

Rapid diagnosis of closed-loop obstruction is critical to prevent complications like strangulation and ischemia. Immediate surgical consultation and clinical vigilance are the keys to ensuring prompt intervention and improved patient outcomes in SBO cases.

#### Abbreviations

|       |                           |
|-------|---------------------------|
| CT    | Computed tomography       |
| LPDHs | Left paraduodenal hernias |
| SBO   | Small bowel obstruction   |

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#### Author contributions

Equal authors' contributions. All authors read and approved the final manuscript.

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#### Availability of data and materials

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#### Declarations

##### Ethics approval and consent to participate

Written informed patient consent for participation has been obtained.

##### Consent for publication

Written informed patient consent for publication has been obtained.

##### Competing interests

Authors declare no competing interests.

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