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(CASE REPORT)

Total volvulus of the small intestine on incomplete common mesentery, an exceptional complication in adults: A case report and review of the literature

Ahmed Zeroual *, Mohammed Essaid Ramraoui, Ahmed EL Guazzar, Mohamed Jawad Fassi EL Fihri, Hicham Baba, Mohammed Lahkim, Ahmed El Khader and Rachid El Barni

Department of Visceral Surgery, Avicenne Military Hospital, Marrakech.

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Abstract

Total volvulus of the small intestine complicating an incomplete common mesentery corresponds to a failure in the 180° rotation of the primitive intestinal loop. The mesenteric root is extremely short, and the entire small intestine is pedicled on the superior mesenteric arterial axis. This condition poses a high risk of small bowel volvulus and entero-mesenteric infarction. Acute volvulus necessitates emergency surgical intervention; imaging should not delay surgical management. The surgical procedure involves detorsion of the volvulus (counterclockwise rotation) and assessment of intestinal viability. The intestine is repositioned in a complete common mesentery configuration: the cecum is placed in the left iliac fossa. We report the case of a 60-year-old patient admitted for total volvulus of the small intestine on incomplete common mesentery, successfully operated on as an emergency, with a favorable postoperative outcome.

Keywords: Total volvulus; Small intestine; Incomplete common mesentery; Rotation anomaly

1. Introduction

Total volvulus of the small intestine due to rotation anomaly of the primitive intestinal loop is an exceptionally rare condition in adults, with only about a hundred cases reported [1]. The common mesentery results from an anomaly in the rotation of the digestive tract. It is characterized by the persistence of an embryonic anatomical disposition caused by the rotation defect of the primitive umbilical loop. This creates a common mesentery for the entire intestinal loop with an extremely short mesenteric root. This incomplete rotation is often associated with a failure of mesenteric fixation [2].

These intestinal rotation anomalies can lead to severe complications, sometimes fatal, typically occurring during the neonatal period or childhood. The prevalence of these congenital malformations in adults is estimated to be between 0.2% and 0.5%; at this age, they are frequently asymptomatic and remain undiagnosed [3]. The diagnosis of total volvulus of the small intestine can arise in various contexts: as an emergency during an acute intestinal obstruction, a state of shock potentially leading to death, or during repeated abdominal pain, sometimes accompanied by transit disturbances.

We report the case of a 60-year-old patient admitted for total volvulus of the small intestine on incomplete common mesentery, successfully treated with emergency surgery and favorable postoperative evolution.

*Corresponding author: Ahmed Zeroual

2. Patient and Observations

This is a 60-year-old patient with no known pathological history admitted to our facility with signs of high intestinal obstruction, accompanied by intense and unbearable abdominal pain and vomiting. These symptoms had been evolving for 24 hours before the patient's arrival at the emergency department.

Upon admission, the patient was: conscious, with a Glasgow Coma Scale (GCS) score of 15, a blood pressure of 150/85 mmHg, a heart rate of 92 beats per minute, a respiratory rate of 25 cycles per minute, and afebrile at 37°C. Additionally, the abdominal examination revealed a distended abdomen, tympanic on percussion, without guarding or rigidity.

An urgent biological workup revealed hypokalemia, but no biological inflammatory syndrome. A plain abdominal X-ray (without preparation) showed air-fluid levels suggestive of a mechanical obstruction. Further imaging with an abdominopelvic CT scan revealed a "whirl" sign involving the jejunal loops, with the cecum in a subhepatic position and the ileal loops located on the right side. The diagnosis of incomplete intestinal obstruction due to malrotation with a common mesentery was confirmed

Figure 1a

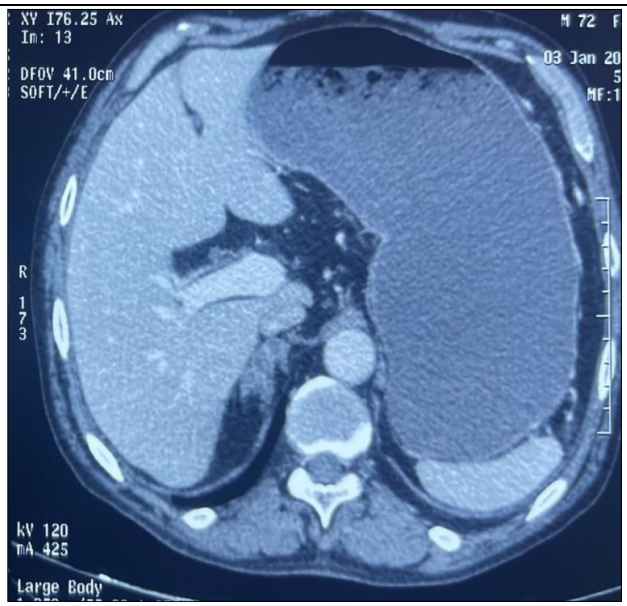

Figure 1b

Figure 1 a and 1b Hydro-aeric levels with grelic appearance in the abdomen without preparation, showing a stagnant stomach on the CT scan

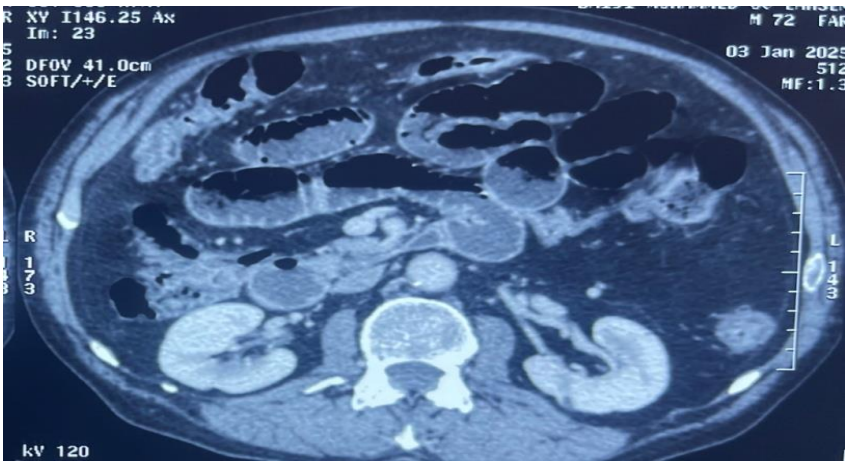

Figure 2a

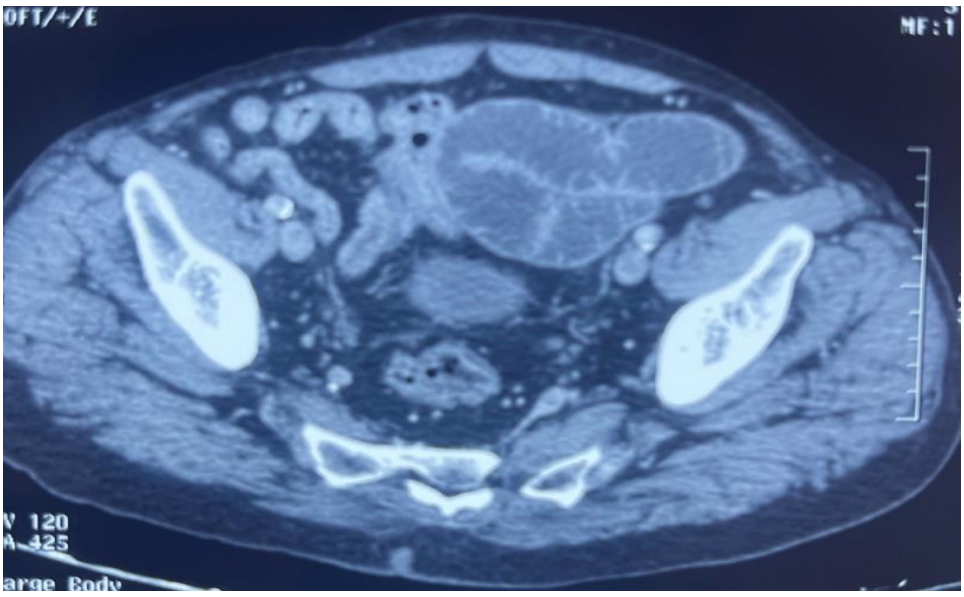

Figure 2b

Figure 2a and 2b Distension of several small bowel loops, containing hydro-aerial levels, with circumferential, segmental, and stenosing wall thickening of an ileal loop, accompanied by multiple adhesions involving small bowel loops and left-sided small bowel-to-colon adhesions

After brief resuscitation, the patient was taken to the operating room as an emergency. Surgical exploration revealed a distended and compromised small intestine with a twist involving the first jejunal loop and the terminal ileal loop . The cecum was found in a subhepatic position, adhered to the abdominal wall by a Ladd's band .

The surgical procedure included untwisting the volvulus in a counterclockwise direction, followed by segmental ileal resection with an end-to-end anastomosis of a severely compromised segment. The rest of the small intestine showed immediate recoloration. The embryological anomaly of intestinal rotation was corrected following Ladd's procedure (division of adhesions, transformation of the incomplete common mesentery into a complete one to prevent recurrence, and an appendectomy as a preventive measure) .

The postoperative course was favorable, and the patient was discharged after 4 days of hospitalization

The anatomopathological specimen revealed small bowel mucosa showing mild chronic inflammatory and congestive changes of non-specific appearance, with no histological evidence of malignancy, Acute ulcerated appendicitis with oxyuriasis and no histological evidence of malignancy.

Figure 3 Appearance of colonic-small bowel adhesions with the left mesocolon entangled within the mesentery

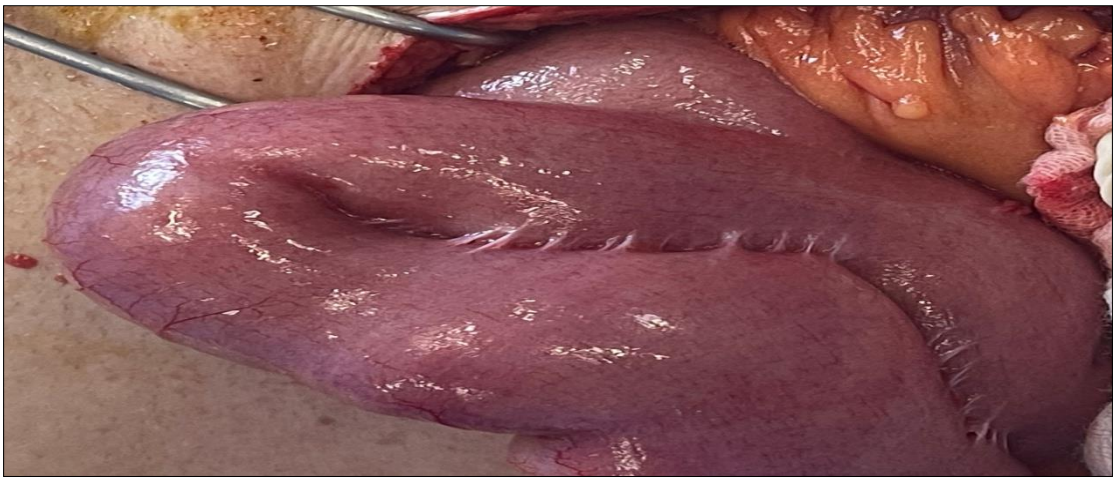

Figure 4 Appearance of layered small bowel adhesions with a mesenteric rotation defect

3. Discussion

The interruption of intestinal rotation at 180° results in a position where the ileocecal junction is located in the subhepatic region [1–6]. This adhesion, if situated near the duodenum, can occasionally cause extrinsic compression of the first or second part of the duodenum, referred to as "Ladd's bands." The duodenojejunal junction is located to the right of the spine. Consequently, the first jejunal loop and the terminal ileal loop are positioned near the superior mesenteric axis and in close proximity to each other. In some cases, there may even be a congenital adhesion between the mesentery of these two loops ("Pellerin's mesenteric fusion" [7]).

In this 180° rotation position, termed "incomplete common mesentery," the mesenteric root is extremely short, and the entire small intestine is "pedicled" on its superior mesenteric vascular axis. This configuration presents a high risk of total small bowel volvulus due to the shortness of the mesenteric root and lack of mesenteric attachment.

The diagnosis of total small bowel volvulus can occur in various scenarios:

- As an emergency, presenting with acute intestinal obstruction, or even shock leading to fatality.
- In cases of recurrent abdominal pain, sometimes associated with transit disturbances [8].
- Rarely, following laparoscopic surgery, as described after cholecystectomy [9], appendectomy [10], or bariatric surgery [11].

Given the nonspecific symptomatology of total small bowel volvulus in the setting of incomplete common mesentery, early suspicion is crucial to confirm the diagnosis, ideally preoperatively, via computed tomography (CT). Contrast-enhanced CT is the gold standard for diagnosing total small bowel volvulus due to incomplete common mesentery in adults [12]. First described by Fisher in 1981 as the "whirl-like pattern," the "whirl" sign is considered pathognomonic for total small bowel volvulus by most authors [13]. This sign represents the twisting of the mesentery seen medially, anterior to the aorta and around the superior mesenteric artery, with the superior mesenteric vein and proximal jejunum "wrapping" around it. Contrast-enhanced images also allow visualization of the verticalization or inversion of the superior mesenteric vessels, with the vein positioned above or to the left of the artery [14], although this sign is not constant.

The thickness of this whirl-like mass is proportional to the degree of volvulus rotation, but calculating the number of mesenteric twists is a more accurate way to assess the degree of rotation [15].

Understanding the anatomy of incomplete common mesentery is essential for intraoperative diagnosis and comprehension of its surgical correction principles. In the typical form of 180° intestinal rotation (incomplete common mesentery):

- The duodenum is short, ending after D2, with the Treitz ligament located to the right of the spine.
- The cecum is in a subhepatic position.
- The mesenteric root is very short, centered on the superior mesenteric vascular axis, and often appears "pedicled."

In cases of acute obstruction, a median laparotomy should be the first choice. Total small bowel volvulus is identified when the entire small intestine is involved in the volvulus and, once exteriorized, appears pedicled on its mesentery. Inspection of the mesentery reveals one or more twists. At this stage, it is crucial to note the direction of the volvulus (most often clockwise), the approximate number of twists, and the bowel coloration [17].

Incomplete common mesentery is identified by:

- The non-anatomical position of the cecum (and any adhesions near the duodenum),
- The position of the Treitz ligament to the right of the spine, and
- The lack of mesenteric attachment, with the mesenteric root appearing very short [18].

Ladd's procedure remains the gold standard treatment for total small bowel volvulus due to rotational anomalies in both adults and children. This procedure involves reducing the volvulus, transforming the incomplete common mesentery into a complete mesentery to prevent recurrence, and performing an appendectomy. The appendix is systematically removed to prevent future ectopic appendicitis [19, 20].

4. Conclusion

Given the nonspecific presentation of total small bowel volvulus due to incomplete common mesentery, early consideration of this diagnosis is essential for confirmation, ideally preoperatively, using contrast-enhanced CT. If this is not possible, every surgeon should be able to recognize and diagnose this condition intraoperatively and understand the principles of its surgical management, specifically the Ladd procedure.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare no conflicts of interest.

Statement of ethical approval

Ethical approval was obtained.

Statement of informed consent

All authors contributed to drafting this manuscript. They also reviewed and approved the final version.

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