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Acute total intestinal volvulus caused by sclerosing mesenteritis: a case report and review of the literature

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Abstract

Background Intestinal volvulus arises from the twisting of an intestinal loop around a fixed axis. This condition is distinguished by both the obstruction and constriction of the intestinal lumen, as well as the entrapment of intestinal blood vessels. Consequently, the intestinal obstruction resulting from volvulus is often of the strangulating variety, which poses a risk for swift intestinal necrosis. Mesenteric tumors are a notable precipitant of volvulus. However, certain nontumor lesions originating from the mesentery can also lead to severe intestinal volvulus.

Case presentation A 68-year-old Chinese female individual was hospitalized because of severe abdominal pain that occurred 6 h after engaging in physical labor. An abdominal computed tomography examination revealed volvulus of the mesenteric root and the presence of a mixed-density mass in the right mesentery, with the possibility of a neoplastic process not ruled out. Emergency surgical exploration confirmed that the small mesenteric tumor served as a pivot, with the mesenteric root twisted 1440°, leading to total necrosis of the small intestine. As a result, total small intestine resection and enterostomy were performed. Postoperative pathological examination of the mesenteric tumor revealed fat necrosis, excessive calcification, peripheral fibrous tissue hyperplasia, and chronic inflammatory cell infiltration, consistent with a diagnosis of sclerosing mesenteritis. The patient's life was saved through timely surgical intervention. However, owing to the development of short bowel syndrome, she will require long-term dependence on parenteral nutrition.

Conclusion Intestinal volvulus due to sclerosing mesenteric inflammation is an exceedingly rare occurrence. Clinicians should maintain a high index of suspicion for this condition when encountering cases of intestinal volvulus attributed to mesenteric tumors. Prompt and decisive surgical intervention is crucial for saving lives and for preserving as much of the intestinal tract as possible.

Keywords Sclerosing mesenteritis, Intestinal volvulus, Treatment, Prognosis

Background

Acute total small intestine volvulus is a severe condition characterized by the near-complete rotation of the small intestine and its mesentery by over 180° around the mesenteric axis. This rotation is accompanied by the twisting of the mesenteric vessels, resulting in circulatory impairments of varying severity within the intestinal tract. In the wake of acute mesenteric ischemia, the affected intestinal segment rapidly progresses to necrosis, which can precipitate secondary septic shock. This life-threatening

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condition, if untreated, is inevitably fatal [1]. Total small intestine volvulus in adults is an uncommon condition with an etiology that remains not fully understood. It is suspected to be associated with various factors, including small intestinal polyps, diverticula, adhesions, lipomas, uterine fibroids, and the aftermath of bariatric surgery, among other potential contributors [2–4]. A case report detailing an intestinal obstruction caused by a lipoma illustrates that mesenteric tumors can lead to mesenteric volvulus and small intestine volvulus as a result of the displacement of intestinal loops [5].

Sclerosing mesenteritis is an uncommon idiopathic condition marked by chronic fat necrosis, inflammation, and fibrosis, predominantly involving the mesentery of the small intestine. Gross examination reveals diffuse thickening of the mesentery, with single or multiple confluent masses present at the mesenteric root, along with surface features of contraction, aggregation, and wrinkling. Patients typically exhibit a range of clinical symptoms, including abdominal pain, nausea, low-grade fever, weight loss, and intestinal dysfunction. On abdominal examination, half of the patients present with a distended abdomen, and palpation may reveal a poorly defined mass. While cases of mesenteric fat necrosis leading to intestinal obstruction have been documented, instances of sclerosing mesenteritis inducing total small bowel volvulus are exceptionally rare [6]. The mesenteric mass resulting from sclerosing mesenteritis may alter the length, position, or fixation of the mesentery, thus providing an anatomical basis for intestinal volvulus. Such masses may compress or displace the intestinal tract, leading to the accumulation of intestinal contents or expansion, thereby increasing the weight of the intestinal tract. Additionally, the mass may restrict the normal movement of the intestinal tract, further elevating the risk of volvulus. When subjected to volvulus, it may compromise the primary vascular structures, including the superior mesenteric artery. This can rapidly result in necrosis of the entire small intestine. Within this article, we detail a case of the latter, offer a discussion on the findings, and provide a comprehensive review of the relevant literature.

Case presentation

Clinical presentation

A 68-year-old Chinese female individual was hospitalized owing to severe, persistent, and colicky abdominal pain that occurred 6 h after engaging in physical labor. The intensity of the pain compelled her to adopt a knee-chest position. She reported a significant weight loss over the preceding 12 months. A total of 11 years prior, she had undergone a "left inguinal hernia repair" in the absence of any abdominal trauma. At the time of admission, she exhibited lower abdominal tenderness, yet without pronounced muscular rigidity.

Imaging

Abdominal computed tomography (CT) imaging (Fig. 1) disclosed findings consistent with mesenteric volvulus accompanied by intestinal obstruction, suggesting a potential for intestinal necrosis. A high-density mass within the right mesentery raised the possibility of a tumor.

Laboratory tests

The patient had a white blood cell count of 19.9×10^9/L with a neutrophil percentage of 86.7%. Her hemoglobin level was 130 g/L, blood lactate was 1.7 mmol/L, lactate dehydrogenase was 236.4 U/L, and creatine kinase was 77.5 U/L. Tumor markers included a carcinoembryonic antigen level of 0.89 ng/ml and a carbohydrate antigen 19–9 level of 6.2 U/ml.

Diagnosis

Her diagnosis was of intestinal volvulus with necrosis, without ruling out a mesenteric tumor.

Surgical situation

The intraoperative exploration exposed a substantial accumulation of turbid, purulent fluid within the abdominal cavity; the majority of the small intestine was purplish-black and grayish-white (Fig. 2). After conversion to laparotomy, a firm mass with an irregular surface and limited mobility was identified at the base of the small intestine mesentery, resulting in a 1440° (four full turns) clockwise rotation of the mesenteric root (Fig. 3). A segment of approximately 400 cm of the small intestine, extending from 5 cm above the duodenojejunal flexure to 3 cm below the ileocecal junction, was determined to be entirely necrotic. In an effort to manage the abdominal infection, a complete resection of the small bowel was carried out, along with the creation of a jejunostomy at the proximal jejunum.

Postoperative pathology

Postoperative pathology findings described a mesenteric mass measuring 4.0 cm × 3.5 cm × 3.0 cm. The mass was firm and hard, resisting sectioning (Fig. 4). Microscopic examination revealed significant calcification, accompanied by a proliferation of fibrous tissue, chronic inflammatory cell infiltration, and areas of fat necrosis. The mesentery also showed signs of congestion, stasis, and hemorrhage. Three lymph nodes were sampled, and no tumor metastasis was detected (Fig. 5).

Due to the prompt intervention, the patient was spared from developing severe septic shock. However,

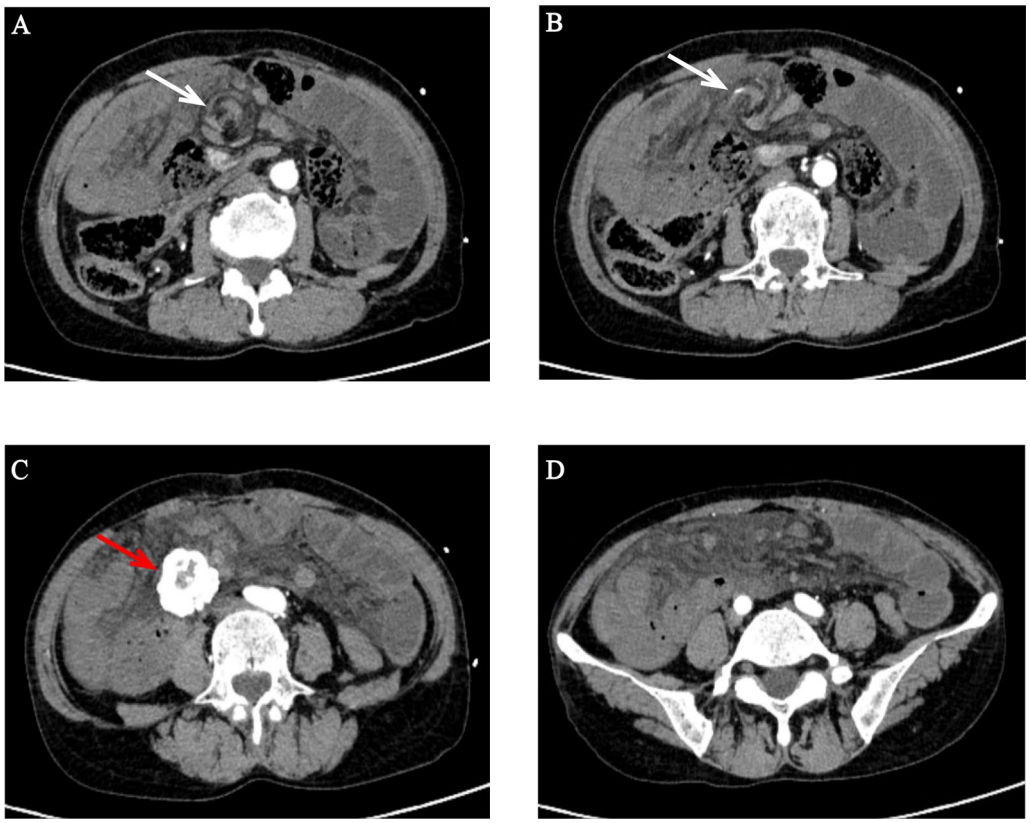

Fig. 1 Intestinal volvulus with necrosis. **A**, **B** Characterized by "whirl sign" (white arrow). The intestine rotates around the central structure, accompanied by edema of the mesentery. The mesenteric vessels are twisted, centering on the superior mesenteric artery and vein, forming a spiral change; **C** mesenteric mixed-density mass with high-density calcification (red arrow); **D** ascites and decreased intestinal wall enhancement suggest intestinal exudation and necrosis

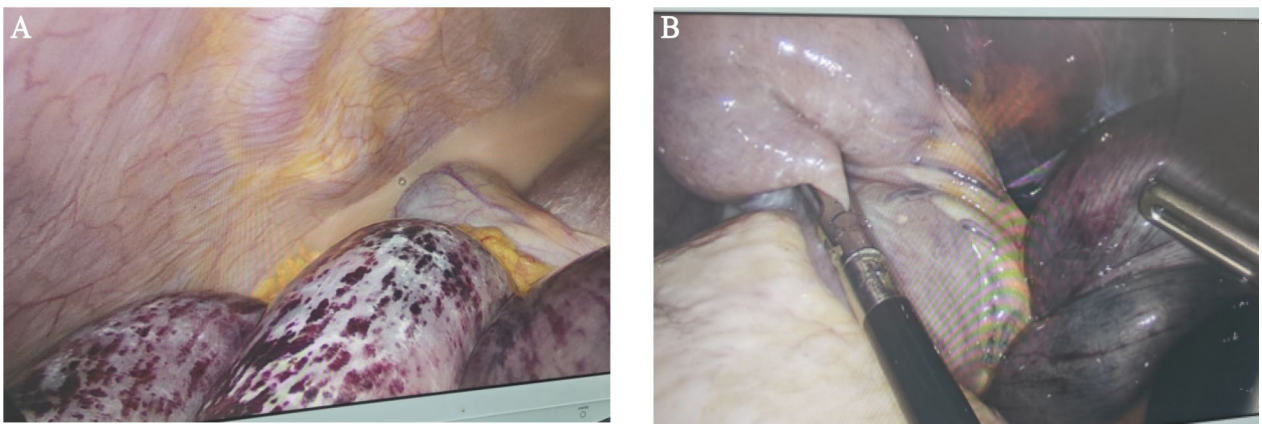

Fig. 2 **A** Abdominal purulent effusion, characterized by its turbidity and foul odor, suggesting intestinal necrosis resulting from arterial ischemia; **B** intestine necrosis; the intestine had taken on a purplish-black hue, with some segments appearing grayish-white

the development of short bowel syndrome is now certain. The patient is projected to require long-term total parenteral nutrition or home parenteral nutrition, and may be a candidate for isolated intestinal transplant at an appropriate future date.

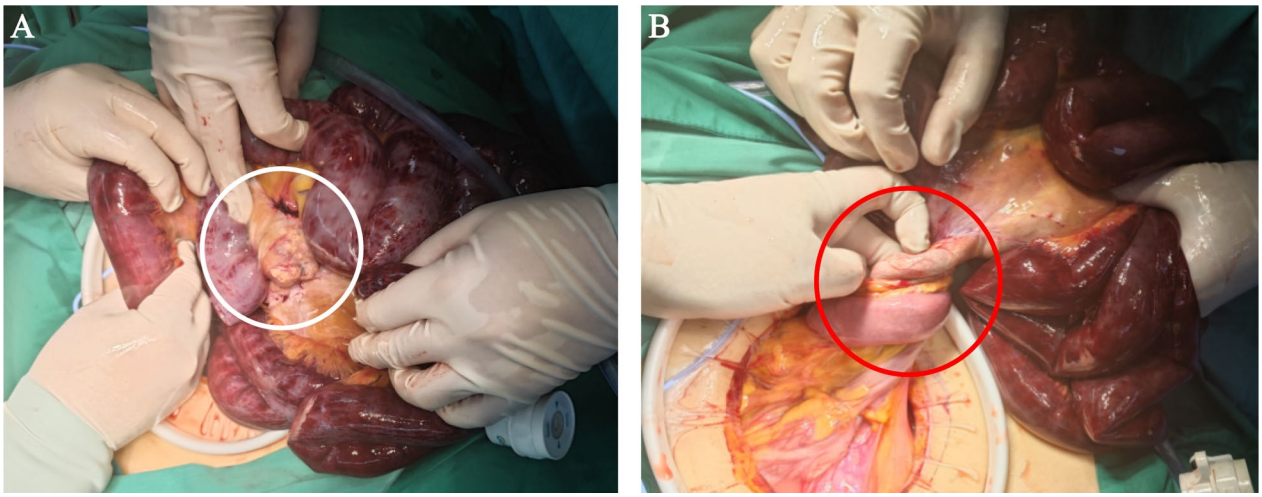

Fig. 3 **A** Mesenteric root mass (white circle) was firm, with an irregular surface, and it was tightly adherent to the mesenteric vessels, rendering it nondisplaceable; **B** the mesenteric root rotates clockwise by 1440° (red circle). The small intestine in the area dominated by the superior mesenteric artery was almost completely necrotic

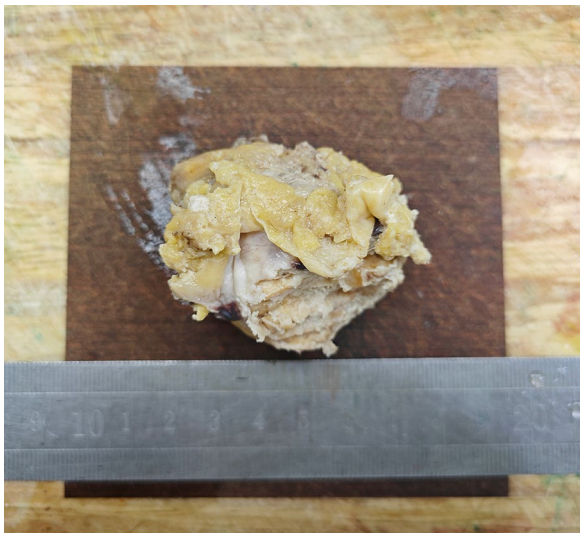

Fig. 4 Macroscopic findings. A clearly demarcated solid mass with a grayish-yellow appearance, firm and hard, resisting sectioning

Discussion and conclusion

Sclerosing mesenteritis is an idiopathic, non-neoplastic condition distinguished by chronic fat necrosis, inflammation, and fibrosis. It was designated as mesenteric panniculitis by Ogden in the 1960s [7]. This disease has been known by various names throughout medical history, such as retractile mesentitis, lipogranuloma of the mesentery, and isolated lipodystrophy, among others. As the lesion progresses, the extents of fat necrosis, fibrosis, and inflammation within it vary. Currently, these terms are regarded as synonymous, all referring to the same condition [8].

Sclerosing mesenteritis occurs approximately twice as frequently in men as in women, with a predilection for adults over the age of 50 years, and it is less commonly seen in children. The etiology and pathogenesis of this condition remain elusive, with contributing factors including a history of abdominal surgery, abdominal trauma, autoimmune conditions, chronic ischemia, infections, and intra-abdominal tumors [9].

The clinical presentation of sclerosing mesenteritis can include abdominal pain, weight loss, diarrhea, anorexia, and abdominal distension. Upon physical examination, abdominal tenderness and the presence of an abdominal mass may be noted. However, many patients are asymptomatic or have no apparent signs, with the condition often being discovered incidentally during imaging studies or surgery [9, 10]. In the case presented, the patient experienced weight loss 1 year prior to the onset of other symptoms.

Diagnosing sclerosing mesenteritis primarily relies on abdominal computed tomography (CT), with the quintessential feature being involvement of the mesenteric root. The characteristic appearance includes a well-demarcated mesenteric fat mass with heterogeneous density, and "fat ring sign" can be observed, that is, an annular low-density ring that can be seen around the blood vessel wall. As the disease advances, CT images of advanced sclerosing mesenteritis typically reveal irregular masses with partial fusion of the mesenteric roots, which are denser than the preexisting soft tissue, indicative of the disease's fibrotic nature, and may show

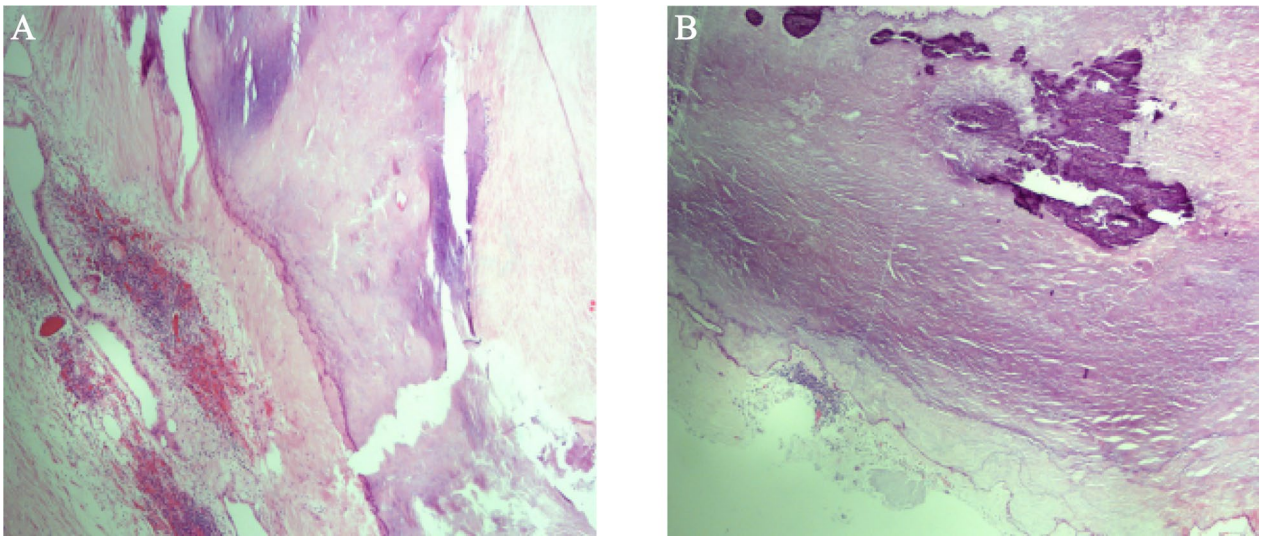

Fig. 5 **A**, **B** Pathological findings revealed extensive calcifications accompanied by peripheral fibrous tissue proliferation, chronic inflammatory cell infiltration, and fat necrosis, leading to the diagnosis of sclerosing mesenteritis

internal calcification within the masses. Magnetic resonance imaging (MRI) is an equally effective diagnostic tool, which excels in displaying fat, soft tissue components, and the extent of vascular involvement. Fibrous tissue contains immobile protons and exhibits low signal in all sequences; T2-weighted imaging or fat suppression sequences are highly valuable in distinguishing benign terminal mesenteric inflammation from malignant tumors [11]. In addition, MRI can also display whether major blood vessels and their branches are affected.

As previously reported, mesenteric lipoma, mesenteric cystic lymphangioma, and sclerosing mesenteritis can cause intestinal volvulus and blood supply disorder, and it is difficult to distinguish them only from clinical manifestations [12, 13]. Imaging examination is an important basis for differential diagnosis. For example, lymphoma is usually accompanied by retroperitoneal lymph node infiltration; after chemotherapy, owing to fibrosis and mesenteric adhesion, it can show high-density mesenteric fog, but there will be no "fat ring sign." Lipoma can show a homogeneous tumor of adipose tissue without fibrosis [12]; Metastasis often fused into a mass when it is implanted and spread in abdominal cavity and involves mesentery. There is no fat-density focus in the tumor and no "pseudocapsule sign" will appear.

Currently, there is no consensus on the treatment of sclerosing mesenteritis. According to expert opinions, asymptomatic patients may be managed with observation alone, without immediate treatment. For those with symptoms such as abdominal pain or compression from an abdominal mass, the preferred initial pharmacological approach is a combination of tamoxifen and prednisone. Surgical intervention is typically reserved for patients who present with mechanical intestinal obstruction and do not respond to conservative medical management [10]. When intestinal volvulus and circulatory disturbances occur, early disruption of the intestinal mucosal barrier may ensue, which can then cause sepsis owing to the displacement of intestinal microbiota. Therefore, sufficient antibiotics must be given to resist infection. Owing to intestinal obstruction, a large amount of fluid is lost, which can easily lead to water electrolyte imbalance and acid–base imbalance. Proper correction should be given before surgery. Surgery should remove as many necrotic and potentially inactive intestinal tubes as possible. The main causes of death for patients are infection and gastrointestinal stress ulcer bleeding. After surgery, attention should be paid to protecting the gastrointestinal mucosa and preventing multiple organ failure. Patients in this case have a poor prognosis. Generally, sclerosing mesenteritis is considered a benign condition, and the majority of cases remain stable over time.

To our knowledge, this represents the first case report of volvulus resulting from sclerosing mesenteritis. Although exceedingly rare in clinical practice, sclerosing mesenteritis can result in severe volvulus of the mesenteric root, leading to ischemic necrosis of the entire small intestine. Consequently, sclerosing mesenteritis should be considered in the differential diagnosis when encountering cases of small intestine volvulus associated with abdominal masses. Early detection and prompt, decisive surgery are paramount for both saving lives and maximizing intestinal preservation.

Abbreviations
CT Computed tomography
MRI Magnetic resonance imaging

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Author contributions
FW and YD took care of the patient. ZL and YW contributed to the study conception and design. FW and ZH contributed to critical revisions to the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials
Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

Declarations

Ethics approval and consent to participate
No ethical approval was required to report this case. However, consent was obtained from the patient before writing the case report.

Consent for publication
Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Competing interests
The authors declare that they have no competing interests.

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