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## Case Report

# A rare complication with superior mesenteric vein thrombosis after laparoscopic sleeve gastrectomy: A case report <sup>☆</sup>

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## ABSTRACT

Laparoscopic sleeve gastrectomy (LSG) has become a frequent procedure to reduce weight and morbid obesity. The procedure involves laparoscopic resection of more than 75% of the greater curvature of the stomach, resulting in early satiety and neuro-hormonal changes that collectively promote effective weight loss. We present a rare case of complication of superior mesenteric vein thrombosis (SMVT) and splenic vein after LSG, with consequent bowel ischemia that was treated with open laparotomy and appropriate anticoagulation therapy. A 56-year-old obese woman (BMI of 42.5 kg/m<sup>2</sup>), smoker for 30 years, presented to the emergency department with symptoms such as abdominal pain, fever, nausea and vomiting, 2 weeks after LSG intervention. Her white blood cell count was 15.5 (normal values: 3.8–10.4 × 10<sup>3</sup> /μL), while C-reactive protein level was 193 (normal values: 0.0–6.0 mg/L) and her D-Dimer level 4.69 (normal values: 0–0.50 mg/L). Abdominal CT with contrast showed a filling defect in the superior mesenteric and splenic vein, free perihepatic and Douglas pouch fluid, as well as small bowel thickening. An open laparotomy was performed and the necrotic segment of bowel of 80 cm was removed. The postoperative period went relatively well, despite the diarrhea that continued for the next 4 months after the intervention. The

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most common causes leading the development of this complication include: hypercoagulable state, dehydration, increased intra-abdominal pressure during the procedure and other secondary factors. The main symptom is abdominal pain, followed by nausea, vomiting, diarrhea and bleeding from the gastrointestinal tract. SMVT and SVT should be considered as a possible complication in patients with abdominal pain and increased inflammatory parameters after LSG. Early diagnosis through CT imaging and rapid anticoagulation therapy is considered to reduce further complications such as intestinal infarction and portal hypertension.

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## Introduction

Metabolic and bariatric surgery is superior to medical therapy in achieving significant weight loss, diabetes remission and remission or improvement of other comorbidities and cardiovascular risk factors [1]. Bariatric surgery should be considered for patients with a BMI  $\geq 40$  or BMI 35-39.9 with a serious comorbidity who have not achieved weight loss goals with lifestyle modifications and drug therapy [2]. Laparoscopic sleeve gastrectomy (LSG) has become a safe and effective primary bariatric surgical method with increasing frequency of use and high popularity for both surgeons and patients [3]. The procedure involves laparoscopic resection of more than 75% of the greater curvature of the stomach, creating a smaller narrow tubular structure with a residual volume of 100 mL. Smaller volume causes early satiety and weight loss. Further mechanisms contributing to weight loss after sleeve gastrectomy include neuro-hormonal changes such as decreased concentrations of the hunger stimulating hormone ghrelin, but a decrease in serum leptin concentrations is also found after the procedure [4]. However, there are some complications of the procedure, such as gastric leakage, bleeding, fluid collection, obstruction, infection, and rarer by frequency, but potentially fatal complication, superior mesenteric vein thrombosis (SMVT) and splenic vein thrombosis (SVT), with a consequence of intestinal ischemia [5]. The main symptom is abdominal pain, followed by nausea and vomiting, lack of bowel movement, decreased appetite, diarrhea, and dehydration [6]. Early diagnosis and appropriate anticoagulant therapy administered immediately after the diagnosis, is essential in preventing further complications such as intestinal infarction and portal hypertension [7,8].

## Case presentation

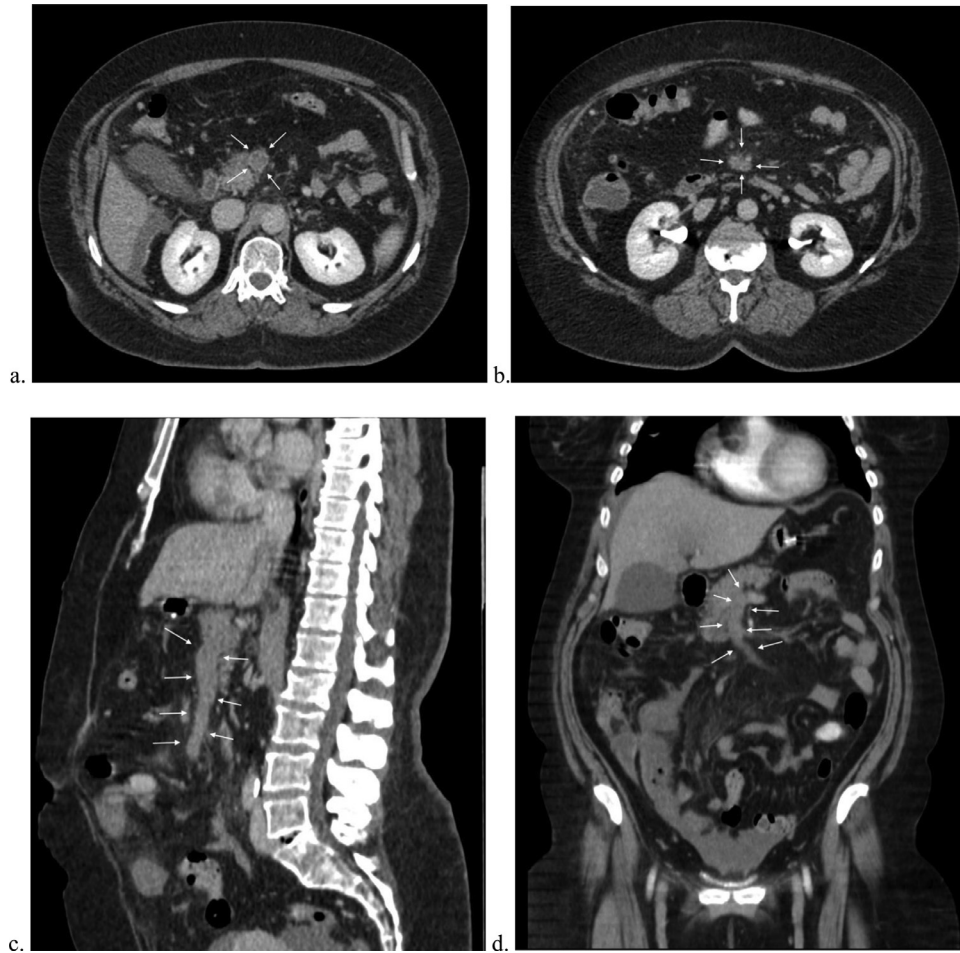
We present a case of a 56-year-old obese woman (BMI of 42.5 kg/m<sup>2</sup>), a 30-year smoker, who underwent a laparoscopic sleeve gastrectomy for weight loss. She was discharged 3 days after the procedure, with instructions for a specific diet and adequate hydration. The patient presented 2 weeks after the procedure, to the emergency room with abdominal pain, fever, nausea and vomiting. Her white blood cell count was 15.5 (normal values:  $3.8-10.4 \times 10^3 /\mu\text{L}$ ), while her C-reactive protein level was 193 (normal values: 0.0-6.0 mg/L) and her D-dimer



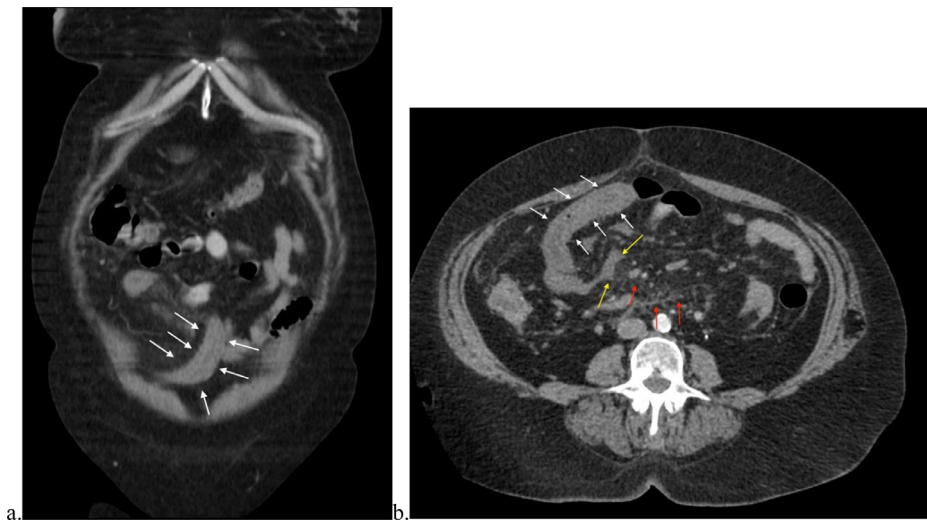
**Fig. 1 – Abdominal and pelvic CT on postcontrast axial image show the stomach after performing the laparoscopic sleeve gastrectomy, resulting in reduction of the stomach lumen in a shape of sleeve. White arrows show the operative hyper-dense suture materials.**

4.69 (normal values: 0-0.50 mg/L). The patient was admitted to the clinic for further evaluation and an abdominal CT was ordered. Postcontrast CT images in the portal phase showed a filling defect in the superior mesenteric vein and splenic vein, presence of perihepatic free liquid and in the pouch of Douglas and increased thickness of the small bowel, as shown on images (Figs. 1–8). The patient was immediately admitted and taken directly to the operation theater. As a result of intestinal ischemia and necrosis, an open laparotomy was performed and the necrotic segment of the intestine of 80 cm was surgically removed. The patient was treated after the operation with antibiotics and anticoagulants, namely dalteparin sodium 60 mg subcutaneous administration, twice a day for 2 weeks. The postoperative period was characterized by prolonged diarrhea during the next 4 months after the intervention.

Four months later, abdominal and pelvic CT control examination showed restored functionality of the SMV with slight irregularities in its central part and fully re-canalized SV. Barium enema showed appropriate propagation of barium through cylinder-shaped stomach, duodenum and small bowels.



**Fig. 2 - (A, B, C, D):** Abdominal and pelvic CT axial and reformatted images, in late phase after the administration of the iodine contrast dye, portal phase abdominal CT shows the filling defect - thrombosis inside the enlarged superior mesenteric vein (white arrows) in A) the upper segment image, in B) the lower segment image, and C) with sagittal reformatting.



**Fig. 3 - (A and B):** Abdominal and pelvic CT coronal (A) and axial (B) images show the edematous and thickened small bowel walls annotated with white arrows in both postcontrast images. In the (B) image, presence of inter intestinal free liquid annotated with yellow arrows, and the dirty fatty tissue nearby the SMV - with the red arrows.

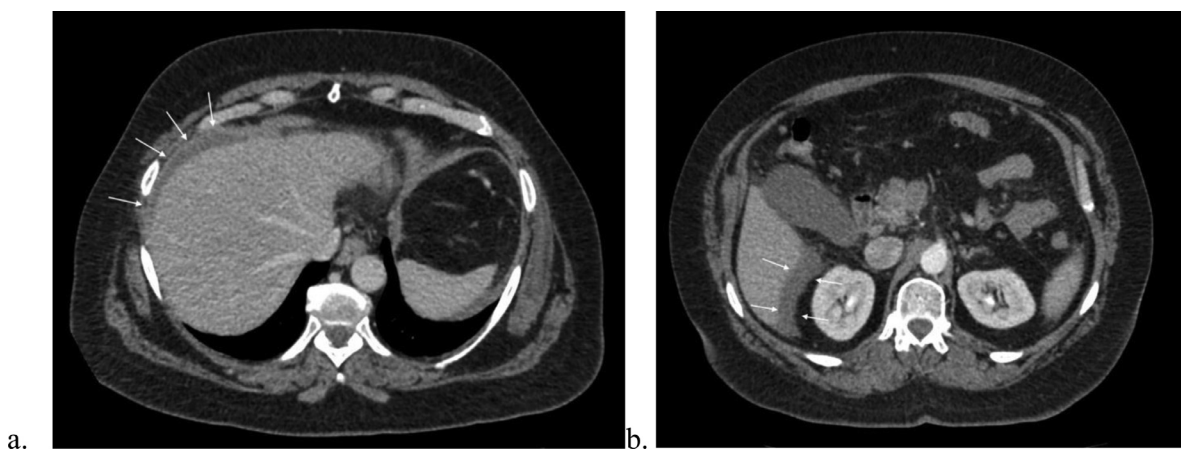


**Fig. 4 – Abdominal and pelvic CT axial images show the partial thrombosis of the splenic vein annotated with white arrows.**

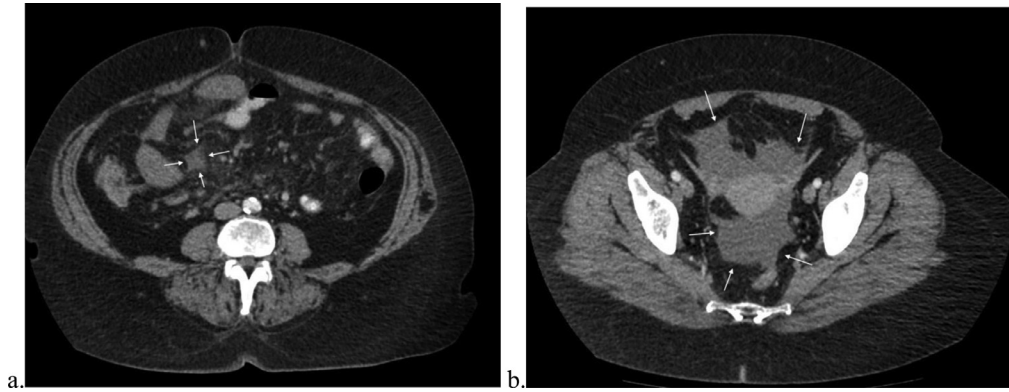
## Discussion

SMVT is uncommon but potentially fatal complication of LSG, which can lead to intestinal ischemia and infarction. There are many factors that contribute to the development of thrombosis of the superior mesenteric vein as a complication of LSG, including dehydration after the procedure, reduced splanchnic and portal circulation, increased intra-abdominal pressure during laparoscopic surgery due to CO<sub>2</sub> insufflation and hypercapnia in itself. There are some secondary factors, appear-

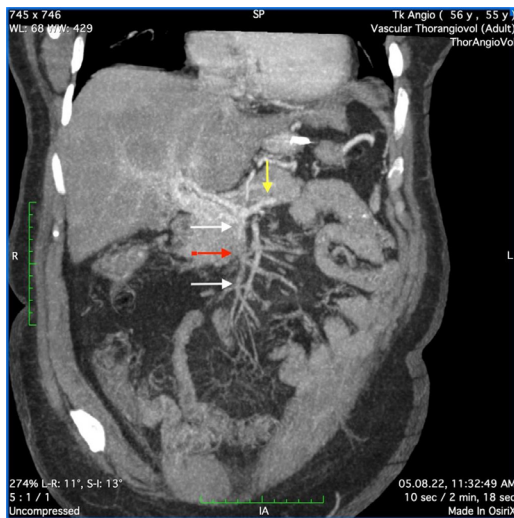
ing in 60% of cases with thrombosis of the mesenteric superior vein, such as congenital hypercoagulable conditions, hematological disorders with thrombophilia, solid neoplasms, hormonal factors (use of contraceptives), autoimmune disorders, pancreatitis, cirrhosis, and bed rest after the procedure [7]. Another contributing factor is considered the movement of a local thrombus created as a result of damage during the intervention [9]. Smoking is also considered an important predisposing factor for the development of thrombosis [5]. The most common symptom of SMVT is a vague crampy abdominal pain, and sometimes accompanied by nausea, vomiting, diarrhea and/or constipation. Hematochezia, melena and hematemesis are rare [10]. Enhanced abdominal CT with oral and intravenous contrast, is the method of choice for diagnosing SMVT, with a sensitivity of 90% [7]. Most patients with mild SMVT can be successfully treated with low molecular weight heparin or intravenous unfractionated heparin, when there are no signs of intestinal ischemia [7]. Patients with acute SMVT should be treated with anticoagulation therapy as soon as possible, in order to recanalize the portal venous system and reduce further thrombotic complications [11,12]. The optimal duration of treatment with systemic anticoagulation has not been definitively determined. Some authors recommended 3-6 months of anticoagulation, while others suggest a longer duration of anticoagulation therapy, ranging from 6-12 months [13,14]. In some cases, when anticoagulation therapy does not seem effective and there is no evidence of intestinal ischemia, percutaneous or trans-hepatic thrombolytic therapy is suggested [5,11,15]. Bowel rest, fluid resuscitation and nasogastric suction are recommended as supportive measures to supplement anticoagulation therapy [11]. In our case, the most likely causes that led to the development of SMVT and SVT were dehydration after the procedure, combined with a predisposition for thrombosis as a result of long-term smoking and the metabolic syndrome itself.



**Fig. 5 – (A and B): Abdominal CT, axial postcontrast images show the presence of the free fluid: perihepatic (A) and (B) subhepatic.**



**Fig. 6 – (A and B):** Abdominal and pelvic CT, axial postcontrast images show the presence of the free fluid: (A) interintestinal and (B) in the Douglas pouch.



**Fig. 7 –** Abdominal and pelvic CT, coronal reconstruction, shows restored functionality of SMV (white arrows) with slight postintraluminal irregularity (red arrow) and fully re-canalized SV (yellow arrow).

## Conclusion

SMVT and SVT should be considered as a possible complication in patients with abdominal pain and increased inflammatory parameters after LSG. Early diagnosis through CT imaging and prompt anticoagulation therapy is considered to reduce further complications such as bowel ischemia, peritonitis and portal hypertension. Dehydration after the procedure and predisposition to thrombosis play an important role in the development of this complication.

## Patient consent

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



**Fig. 8 – (A and B)** Gastro duodenography image and small bowel enema show reduced volume and cylinder shape of the stomach, as well as appropriate propagation of barium, respectively.

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