Ischemic Colitis Secondary to Superior Mesenteric Vein Thrombosis in Hepatocellular Carcinoma: A Case Report

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Each author contributed to the idea of the paper, the research of the case, and the editing of the case report.

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HUMAN AND ANIMAL RIGHTS
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ABSTRACT

Hepatocellular carcinoma most commonly complicates with portal vein thrombosis. However, extension into the superior mesenteric vein, causing mesenteric venous thrombosis and subsequent ischemic colitis, is a rare and life-threatening sequela that poses a significant diagnostic challenge. A 55-year-old man presented with a two-week history of progressive abdominal pain, distention, and obstipation followed by diarrhea. Initial suspicion was a colonic obstruction. Contrast-enhanced computed tomography revealed an infiltrative HCC with extensive tumor thrombus extending into the portal, splenic, and superior mesenteric veins, causing circumferential bowel wall thickening and fat stranding. Laparotomy confirmed a liver mass and ischemic bowel, with histopathology confirming well-differentiated HCC. The patient was managed with surgical resection and supportive care, with anticoagulation deferred due to high post-operative bleeding risk. This case highlights that HCC can present with features of bowel obstruction secondary to mesenteric veno-occlusion from tumor thrombus. It underscores the critical importance of considering vascular etiologies like SMV thrombosis in patients with known or suspected malignancy who present with acute abdominal symptoms. Early contrast-enhanced CT is essential for correct diagnosis and timely intervention to prevent catastrophic bowel infarction.

CASE REPORT

BACKGROUND

Hepatocellular carcinoma (HCC) is a leading cause of cancer-related mortality worldwide, frequently arising in the context of chronic liver disease and cirrhosis. Common complications of advanced HCC include intra-abdominal hemorrhage, liver failure, and portal vein thrombosis [1]. However, the extension of thrombus into the superior mesenteric vein (SMV), leading to mesenteric veno-occlusive disease and subsequent ischemic colitis, represents a rare and critically important clinical sequela [2].

This complication poses a significant diagnostic challenge. Its presentation with abdominal pain, distension, and altered bowel habits can closely mimic more common conditions such as mechanical ileus or primary colonic pathology, often leading to initial misdiagnosis. A delay in recognizing the underlying vascular cause can result in catastrophic outcomes due to the risk of progressive bowel ischemia [3].

We present a case of a 55-year-old male whose initial presentation suggested a primary colonic obstruction. The subsequent workup, however, revealed an unexpected diagnosis of ischemic colitis secondary to superior mesenteric vein thrombosis caused by an infiltrative hepatocellular carcinoma. This report highlights the diagnostic pitfalls and emphasizes the importance of considering this rare complication in patients presenting with acute abdominal symptoms, particularly in the context of underlying liver disease or malignancy.

CASE REPORT

History Taking and Physical Examination

A 55-year-old male smoker with a two-week history of progressive abdominal pain, constitutional symptoms, and bowel obstruction was transferred for a laparotomy for a suspected left colon tumor. On physical exam, the patient was

compos mentis but in moderate distress with tachycardia and tachypnea, and his abdomen was soft with isolated right upper quadrant tenderness. The rest of the exam was normal.

Imaging findings

Initial radiographic evaluation included thoracic and abdominal X-rays. The chest X-ray was unremarkable, with no cardiopulmonary abnormalities. However, the abdominal X-ray in two positions revealed a localized ileus in the mid-abdomen, evidenced by excessive gas distribution within loops of bowel in that region (Figure 1).

A contrast-enhanced CT scan of the abdomen and pelvis revealed profound abnormalities. It showed an enlarged, cirrhotic liver with diffuse, ill-defined masses, the largest measuring approximately 5.0 cm, with features suggestive of infiltrating hepatocellular carcinoma. This was associated with extensive thrombosis of the portal (Figure 2), splenic (Figure 3), and superior mesenteric veins (Figure 4). The scan also revealed circumferential wall thickening of the jejunum, ileum, and ascending colon with surrounding fat stranding (Figure 5), highly suspicious for intestinal ischemia due to the mesenteric veno-occlusive disease. Additional findings included splenomegaly, ascites, and multiple mesenteri-c lymph nodes.

A biopsy was performed on the liver and mesocolon tissues. The microscopic examination of the liver specimen confirmed the diagnosis of a well-differentiated hepatocellular carcinoma.

DISCUSSION

Mesenteric venous thrombosis (MVT) is a relatively rare condition, with the superior mesenteric vein being the most commonly affected site. The incidence of acute mesenteric ischemia, which includes cases due to venous thrombosis, ranges from 0.63 to 12.9 per 100,000 people per year [4,5]. Mesenteric ischemia, which can be acute or chronic, is subcategorized as occlusive (from a blockage) or non-occlusive. Occlusive cases involve arteries or veins, with mesenteric venous thrombosis accounting for 5–15% of instances [6–8].

Mesenteric venous thrombosis may occur in the superior mesenteric, inferior mesenteric, and portal veins, which are the most common sites for clot formation. When thrombosis specifically affects the superior mesenteric vein (SMVT), it is often due to factors disrupting Virchow's Triad—hypercoagulability, stasis, and endothelial injury—such as clotting disorders (e.g., factor V Leiden mutation) or predisposing conditions like recent abdominal surgery. The pathophysiology involves thrombotic occlusion leading to impaired venous return, bowel congestion, and ischemia[3]. If this ischemic process localizes to the colon, it can manifest as ischemic colitis [3]. However, ischemic colitis itself is an uncommon condition (incidence 6.1–22.9/100,000 person-years) that is typically not a result of major occlusive disease but rather reversible local hypoperfusion; it is more prevalent in females and increases with age. Without prompt intervention, the progression from SMVT to ischemia can result in intestinal infarction [9].

Clinical and Imaging Findings

The patient's presentation was classic for a partial bowel obstruction, marked by progressive abdominal distention and an initial period of obstipation. This obstructive pattern, combined with constitutional symptoms like weight loss, strongly suggested a mechanical cause, which was intraoperatively confirmed to be a HCC. Because the symptoms are often vague, imaging is the only reliable method for diagnosis. A CT scan is the most accurate test available (up to 100% sensitivity), while ultrasound and angiography are less sensitive, at about 70% [10]. The contrast-enhanced CT scan revealed features highly suggestive of an infiltrative HCC. To establish a definitive histological diagnosis and confirm the imaging findings, a liver biopsy was performed and conclusively confirmed the presence of hepatocellular carcinoma.

The CT findings are pathognomonic for superior mesenteric venous thrombosis. The extensive thrombosis within the portal, splenic, and superior mesenteric veins, coupled with the characteristic signs of intestinal ischemia including circumferential bowel wall thickening and surrounding fat stranding provides a classic radiographic picture of mesenteric veno-occlusive disease. Mesenteric venous occlusion, in contrast to the thin bowel wall of arterial ischemia, typically causes the bowel wall to thicken circumferentially [11]. This happens because arterial blood continues to flow in, but the outflow is blocked by the venous clot, leading to a dangerous buildup of pressure. This pressure forces fluid into the submucosa, creating a distinctive "target" or "halo" sign on imaging, as the edematous layer is sandwiched between the inner and outer enhanced layers [8]. The bowel wall, normally only 2–3 mm thick, can swell to as much as 1.5 cm [11]. Fluid also leaks into the surrounding mesenteric fat, causing "stranding," or ascites and this infiltration of the perienteric mesentery may be an important clue to diagnosis [12,13]. Underlying causes of venous occlusion can include inflammatory conditions like diverticulitis or pancreatitis, as well as cancer, which presented in this case [8].

The radiological presentation of mesenteric venous occlusion demonstrates a remarkable consistency across different etiologies, creating a diagnostic challenge where distinct diseases appear as mimics. In our case, as in the cases of Mesenteric Inflammatory Veno-Occlusive Disorder (MIVOD) reported by Finan & Browne (2017), computed tomography (CT) reveals a common constellation of findings indicative of bowel compromise. These shared features include circumferential bowel wall thickening, mesenteric fat stranding, ascites, and the presence of venous thrombosis. This overlap underscores a critical principle that radiology is exceptional at identifying the effects of a disease like venous obstruction and subsequent ischemia but is often limited in revealing the underlying cause [14].

The mesenteric ischemia in this case is pathophysiologically distinct from the non-occlusive mechanism described by Radosavaljevic et al. (2025), which was triggered by hemorrhagic shock and splanchnic vasoconstriction [15]. In contrast, our patient's ischemia was occlusive, resulting from a direct mechanical veno-occlusive event rather than a systemic low-flow state.

The principal strength of this report is its comprehensive documentation of a rare complication, providing a clear diagnostic pathway that integrates clinical, radiological, and histopathological findings of critical complication of HCC. However, as a single case study, its conclusions are limited by the inherent inability to generalize management strategies. A key weakness is the lack of follow-up data, which precludes any assessment of the patient's long-term outcome or the effectiveness of the chosen treatment approach.

In conclusion, this case illustrates a rare but critical complication of advanced hepatocellular carcinoma, which is superior mesenteric vein thrombosis that leading to ischemic colitis. The patient's initial presentation mimicked a more common surgical abdomen, specifically a mechanical colonic obstruction. The definitive diagnosis was achieved through the integration of clinical suspicion, characteristic findings on contrast-enhanced CT which demonstrated the tumor thrombus and its ischemic consequences and histopathological confirmation. Clinicians should maintain a high index of suspicion for mesenteric vascular events in patients with underlying malignancies to enable prompt diagnosis and improve outcomes.

TEACHING POINTS

This case highlights that advanced hepatocellular carcinoma can cause mesenteric ischemia via direct tumor thrombus extension into the superior mesenteric vein, a diagnosis confirmed by contrast-enhanced CT. It underscores the necessity of integrating imaging findings with clinical history to differentiate this occlusive etiology from other mimics like NOMI or MIVOD. Furthermore, this case confirms that cross-sectional imaging is indispensable, guiding the diagnosis, etiologic differentiation, and therefore affect subsequent therapeutic management of this complex condition.

QUESTIONS

Question 1: Which of the following statements about mesenteric venous thrombosis (MVT) in the context of hepatocellular carcinoma (HCC) is false?

1. MVT can be caused by direct extension of a tumor thrombus from HCC.
2. The primary initial treatment for MVT is always immediate surgical intervention.
3. Contrast-enhanced CT is the imaging modality of choice for diagnosis.
4. Clinical presentation can mimic a mechanical bowel obstruction.
5. Anticoagulation may be deferred in the post-operative period due to bleeding risk.

Explanation:

1. True: HCC can directly invade the portal and mesenteric venous systems, forming a tumor thrombus.
2. False (Correct Answer): The initial management is medical stabilization; surgery is reserved for cases of bowel infarction or peritonitis. The primary treatment for MVT itself is anticoagulation, not surgery.
3. True: CT has excellent sensitivity for detecting venous thrombosis and signs of bowel ischemia.
4. True: Symptoms like abdominal pain, distention, and obstipation are common to both conditions.
5. True: The risk of post-operative hemorrhage may outweigh the benefit of immediate anticoagulation, requiring an individualized approach.

Question 2: What is the most critical finding on a contrast-enhanced CT scan that distinguishes mesenteric venous thrombosis from non-occlusive mesenteric ischemia (NOMI)?

1. The presence of ascites.
2. Circumferential bowel wall thickening.
3. A filling defect within the superior mesenteric vein.
4. Mesenteric fat stranding.
5. Pneumatosis intestinalis.

Explanation:

1. Ascites is a non-specific finding present in both conditions.
2. Bowel wall thickening is a consequence of ischemia and is not specific to the cause.
3. Correct: A filling defect (thrombus) in the mesenteric vein is pathognomonic for venous occlusion, whereas in NOMI, the major vessels are patent.
4. Fat stranding is a common sign of inflammation or ischemia, not specific to the etiology.
5. Pneumatosis indicates advanced bowel ischemia but does not differentiate between occlusive and non-occlusive causes.

Question 3: A contrast-enhanced CT scan of a patient with known hepatocellular carcinoma reveals bowel wall thickening. Which of the following associated CT findings is most specific for identifying mesenteric venous thrombosis as the cause of ischemia, rather than a primary bowel obstruction?

1. The presence of free fluid (ascites) in the peritoneal cavity.
2. A filling defect within the lumen of the superior mesenteric vein.
3. Enlarged mesenteric lymph nodes.
4. The presence of a liver mass with arterial hyperenhancement.
5. The "target sign" (halo sign) of the thickened bowel wall.

Explanation:

1. Ascites is a non-specific finding seen in both obstructive and ischemic pathologies.
2. Correct: A filling defect in the SMV is the direct and pathognomonic sign of venous thrombosis, confirming a vascular etiology for the bowel wall thickening.
3. Lymphadenopathy can be reactive and is not specific to venous thrombosis.
4. While confirming the primary malignancy, this finding does not explain the cause of the bowel wall thickening.
5. While suggestive of edema from venous ischemia, the target sign is not pathognomonic and can be seen in other inflammatory conditions.

Question 4: The circumferential bowel wall thickening seen on CT in this case of superior mesenteric vein thrombosis (SMVT) is primarily caused by which of the following pathophysiological mechanisms?

1. Hyperperistalsis and muscular contraction.
2. Ischemic necrosis and tissue sloughing.
3. Elevated intramural hydrostatic pressure from continued arterial inflow against venous outflow obstruction.
4. Lymphatic obstruction by the tumor thrombus.
5. Infiltration of the bowel wall by hepatocellular carcinoma cells.

Explanation:

1. Hyperperistalsis does not cause persistent, circumferential wall thickening.
2. Necrosis would typically lead to wall thinning or perforation, not thickening.
3. Correct: In venous occlusion, arterial inflow continues, but the blocked venous return causes blood and fluid to extravasate into the bowel wall, leading to edema and thickening. This is the hallmark mechanism of veno-occlusive disease.
4. While possible, lymphatic obstruction is not the primary or most direct mechanism for the acute wall thickening in this scenario.
5. Direct tumor infiltration of the bowel is extremely rare in HCC and not the cause of the diffuse thickening seen here.

Question 5: In a patient with hepatocellular carcinoma, a contrast-enhanced CT shows thrombosis extending from the portal vein into the superior mesenteric vein. Which radiologic feature is most crucial for differentiating a bland thrombus from a tumor thrombus?

1. The presence of circumferential bowel wall thickening downstream from the thrombus.
2. Contour irregularity and arterial-phase enhancement of the thrombus itself.
3. Mesenteric fat stranding surrounding the affected venous segment.
4. A non-expanded vein diameter with a homogeneous thrombus on all phases.
5. Splenomegaly and the presence of portosystemic collaterals.

Explanation:

1. Bowel wall thickening indicates the effect of venous occlusion but does not characterize the thrombus type.
2. Correct: Tumor thrombi often demonstrate neovascularity, showing contrast enhancement in the arterial phase, and may have an expanded, irregular contour, unlike bland thrombi.
3. Fat stranding is a sign of inflammation or ischemia and is not specific to the thrombus composition.
4. This description is more characteristic of a bland thrombus, making it a good distractor but not the feature that *definitively* identifies a tumor thrombus.
5. These are signs of portal hypertension, which can be associated with both bland and tumor thrombi, and are not discriminatory.

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FIGURES

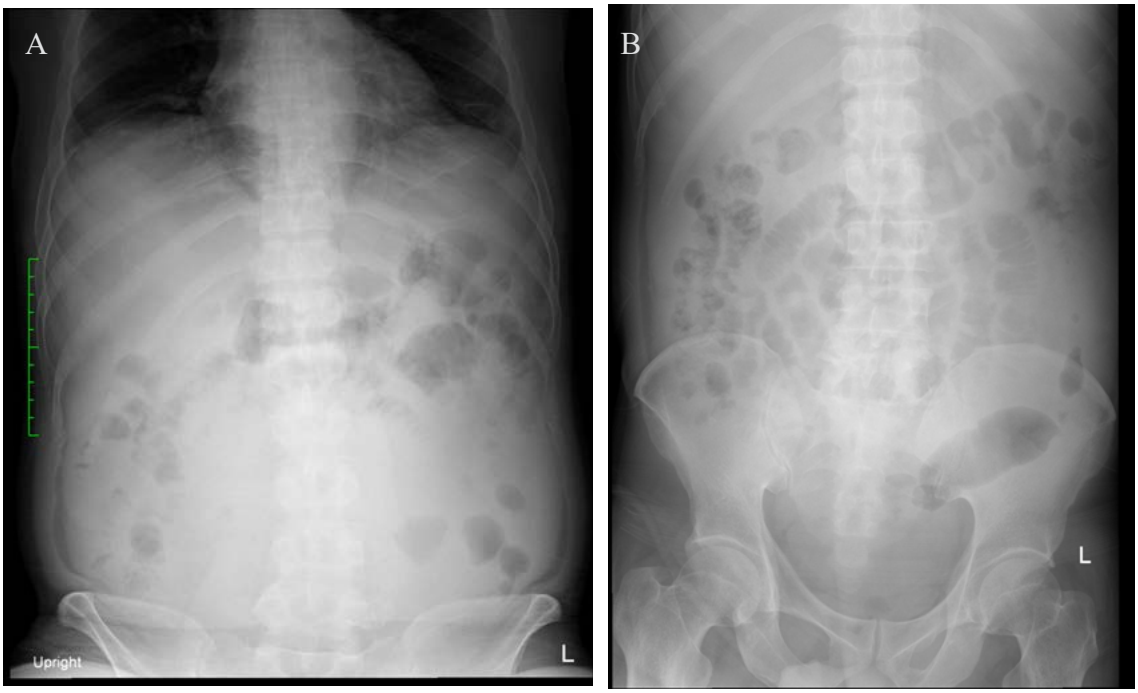

Figure 1: A two-view abdominal Blass Nier Overzicht (BNO) X-ray (A and B) revealed a localized mid-abdominal ileus, with prominent gas distention visible in several small bowel loops.

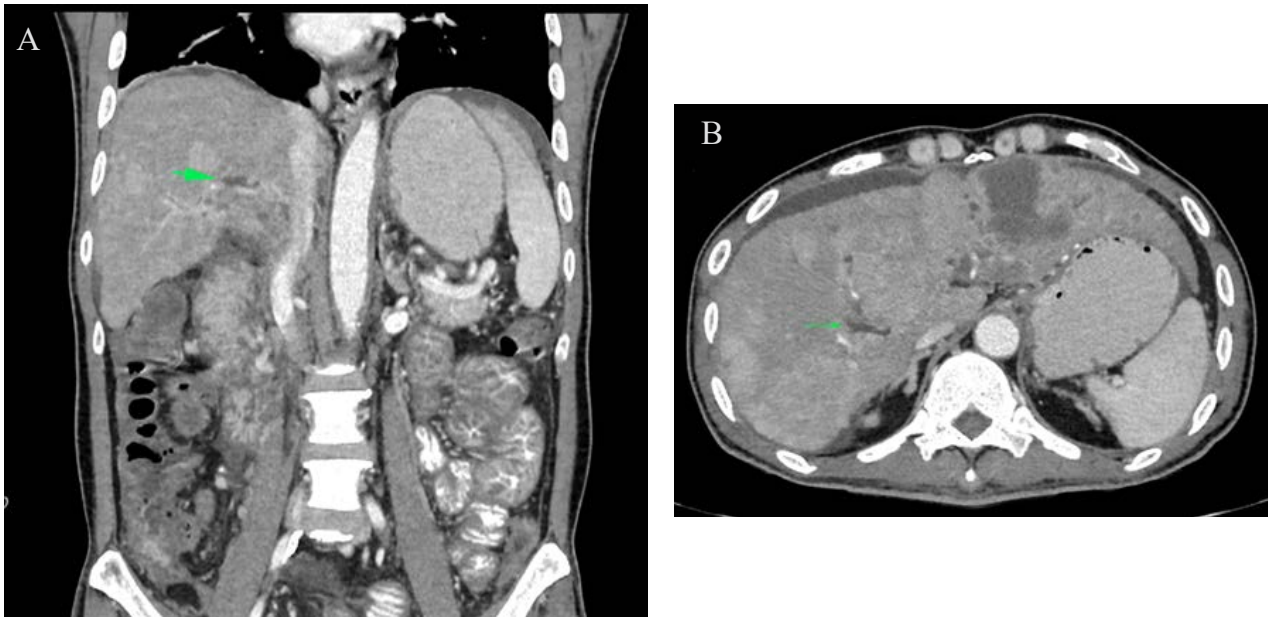

Figure 2: Coronal (A) and transverse (B) contrast-enhanced CT image demonstrates a filling defect within the lumen of the portal vein (arrow), consistent with thrombosis.

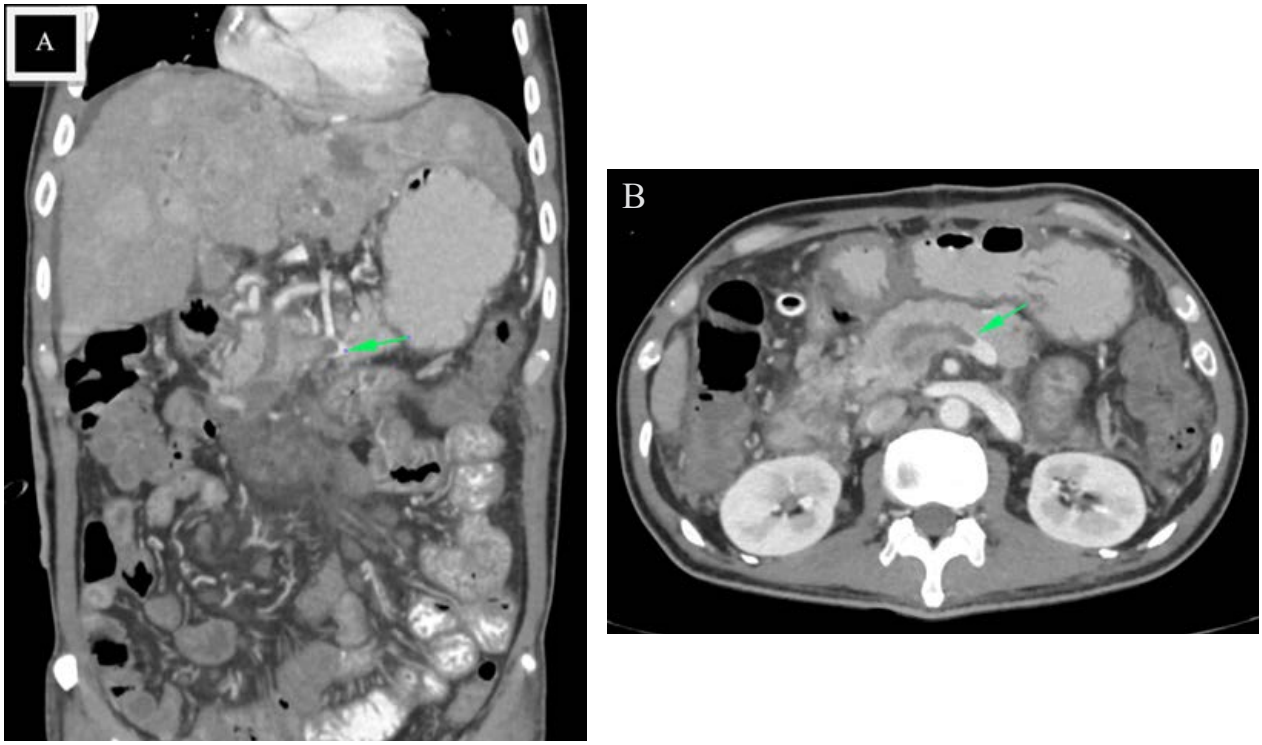

Figure 3: Coronal (A) and transverse (B) contrast-enhanced CT image demonstrates a filling defect within the lumen of the splenic vein (arrow), consistent with thrombosis.

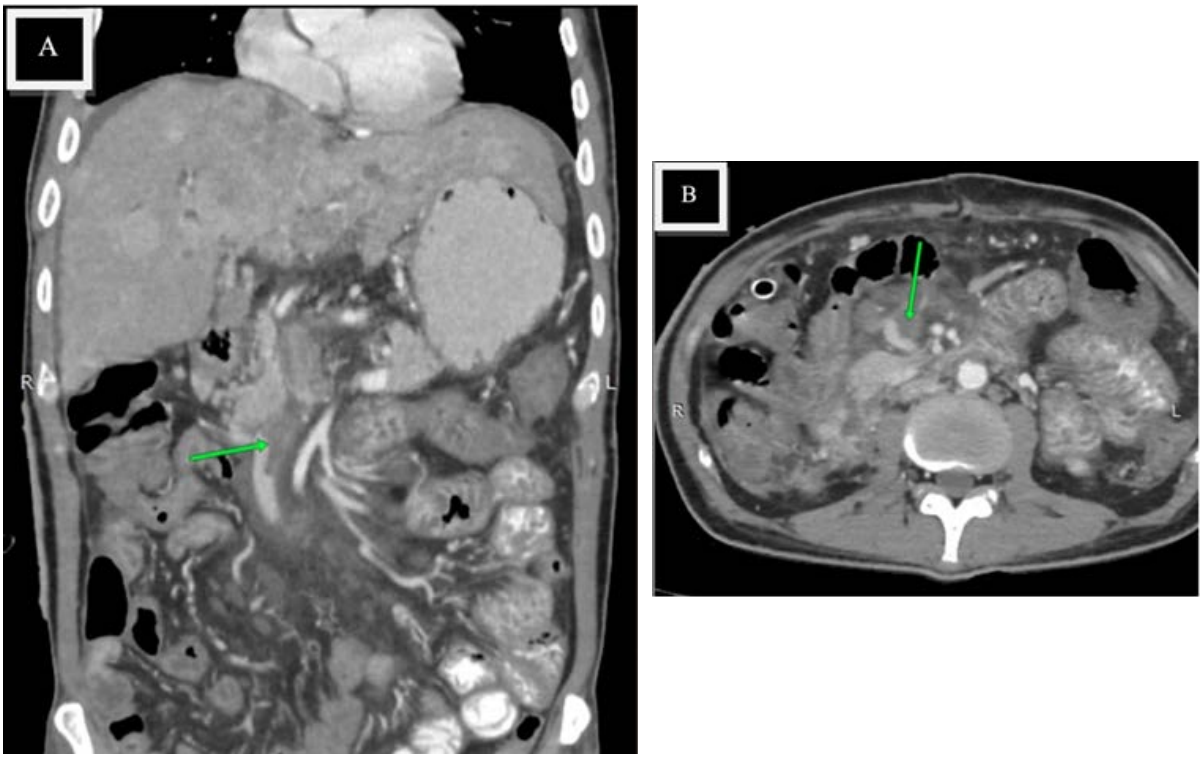

Figure 4: Coronal (A) and transverse (B) contrast-enhanced CT image demonstrates a filling defect within the lumen of the superior mesenteric vein (SMV) (arrow), consistent with thrombosis.

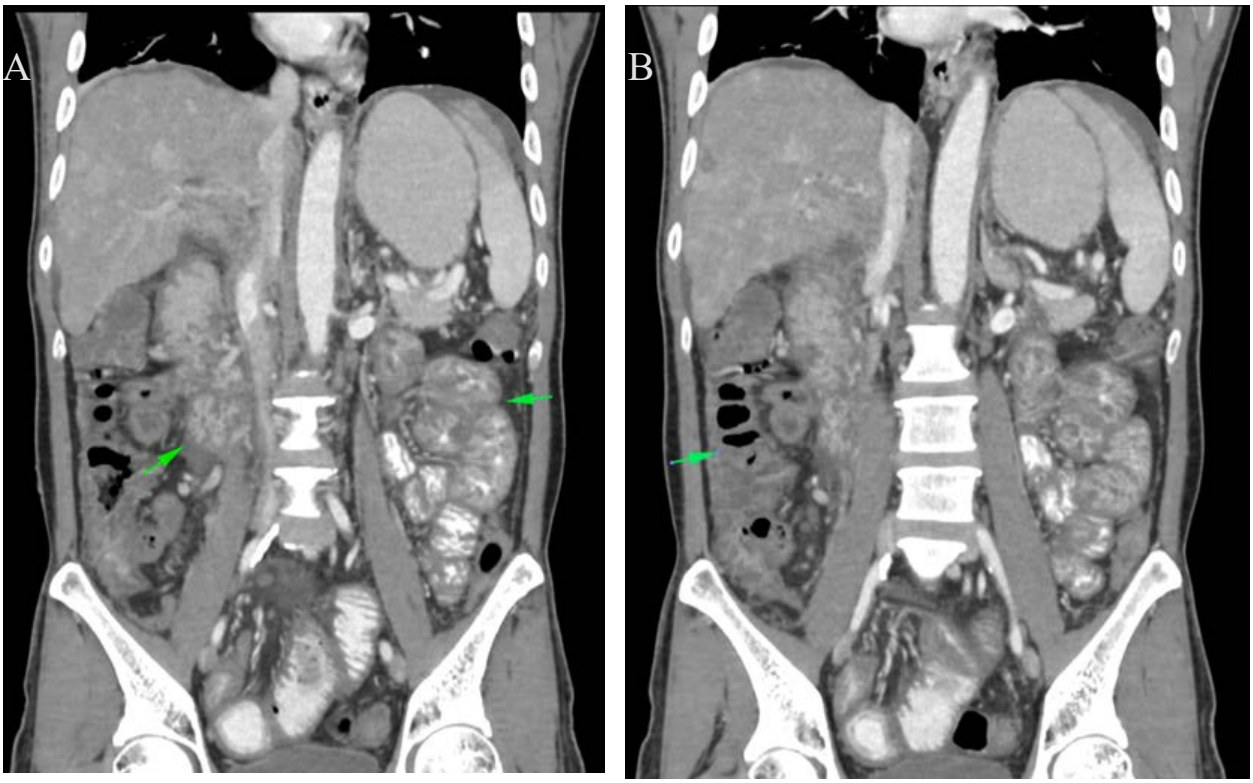

Figure 5: Coronal (A and B) contrast-enhanced CT image demonstrates Bowel wall thickening of the jejunum, ileum, and ascending colon with fat stranding.;

KEYWORDS

Case Report; Hepatocellular Carcinoma; Ischemic Colitis; Superior Mesenteric Vein; Thrombosis

ABBREVIATIONS

AMI = Acute Mesenteric Ischemia
AP = Anterior Posterior
BNO = Blass Nier Overzicht
CRT = Capillary Refill Time
CT = Computed Tomography
GCS = Glasgow Coma Scale
HCC = Hepato Cellular Carcinoma
MIVOD = Mesenteric Inflammatory Veno-Occlusive Disease
MVT = Mesenteric Venous Thrombosis
NOMI = Non-Occlusive Mesenteric Ischemia
PMN = Poly Morphonuclear Leukocytes
RUQ = Right Upper Quadrant
SMV = Superior Mesenteric Vein
SMVT = Superior Mesenteric Vein Thrombosis
SpO2 = Peripheral Oxygen Saturation

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