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Extensive intestinal gangrene due to mesenteric venous thrombosis: a case report with CT findings

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Abstract
Acute mesenteric ischemia (AMI) is a life-threatening vascular emergency characterized by compromised intestinal perfusion, often leading to bowel infarction if not promptly diagnosed. Mesenteric venous thrombosis (MVT), though less common than arterial causes, presents insidiously and is frequently associated with delayed diagnosis and high morbidity.
We report a case of a 54-year-old male presenting with progressive, poorly localized abdominal pain for 15 days, associated with melena and hematemesis. Clinical examination revealed diffuse abdominal tenderness with minimal peritoneal signs. Laboratory findings showed leukocytosis, anemia, elevated serum lactate, and mild renal dysfunction. Contrast-enhanced computed tomography (CECT) abdomen demonstrated dilated small bowel loops with reduced mural enhancement, pneumatosis intestinalis, mesenteric congestion, and inter-bowel free fluid. A non-enhancing intraluminal thrombus was identified within the superior mesenteric vein extending into the portal vein, consistent with extensive mesenteric venous thrombosis. Imaging features suggested non-viable bowel. Exploratory laparotomy confirmed transmural bowel gangrene, necessitating surgical resection.
Mesenteric venous thrombosis accounts for a minority of AMI cases but poses significant diagnostic challenges due to its subacute clinical course. CECT plays a pivotal role in early diagnosis by identifying venous thrombus, bowel wall hypoenhancement, mesenteric edema, and complications such as pneumatosis intestinalis. Recognition of these imaging features is critical for timely intervention and improved patient outcomes.
This case highlights the importance of maintaining a high index of suspicion for mesenteric venous thrombosis in patients with disproportionate abdominal pain and nonspecific findings. Multidetector CT is indispensable for early diagnosis, assessment of disease severity, and guiding management. Prompt radiologic identification of advanced ischemic changes can significantly impact prognosis in this potentially fatal condition

Keywords: Acute mesenteric ischemia, mesenteric venous thrombosis, intestinal ischemia, bowel infarction, abdominal pain, melena, hematemesis, leukocytosis

Introduction

Acute mesenteric ischemia (AMI) is a life-threatening vascular emergency characterized by a sudden compromise of intestinal blood flow, often associated with high morbidity and mortality if not promptly recognized and managed [1].
It encompasses a spectrum of etiologies, including arterial embolism, arterial thrombosis, non-occlusive ischemia, and mesenteric venous thrombosis, each differing in pathophysiology and clinical course [2].
Despite advances in diagnostic and therapeutic strategies, AMI continues to pose a significant clinical challenge due to its variable and often nonspecific presentation [3].
Cross-sectional imaging, particularly contrast-enhanced computed tomography (CT), plays a pivotal role in the early diagnosis by demonstrating bowel wall changes, vascular compromise, and secondary complications [4].
A high index of clinical suspicion combined with timely imaging is essential, as delayed diagnosis is strongly associated with increased rates of bowel infarction and mortality [5].
Biphasic multidetector CT angiography has demonstrated high diagnostic accuracy in evaluating mesenteric vasculature and identifying ischemic changes in the bowel [6].
Clinically, patients may present with disproportionate abdominal pain relative to physical findings, a hallmark yet often overlooked feature of early disease [7].
The condition may also manifest with nonspecific symptoms such as nausea, vomiting, and altered bowel habits, further contributing to diagnostic delay [8].
Radiological resources emphasize the importance of recognizing both vascular and bowel wall findings to establish a timely diagnosis [9].
Recent studies highlight the evolving role of multidetector CT in improving diagnostic confidence and facilitating early therapeutic decision-making [10].
Meta-analyses have demonstrated high sensitivity and specificity of multidetector CT, reinforcing its role as the imaging modality of choice in suspected AMI [11].
Among the various etiologies, thromboembolic occlusion of the superior mesenteric artery remains one of the most common and severe forms of AMI [12].
Multidetector CT angiography not only aids in diagnosis but also guides surgical and endovascular management strategies [13].

Case Presentation

A 54-year-old male presented to the emergency department with complaints of diffuse abdominal pain for 15 days, which was insidious in onset, progressive in intensity, and poorly localized. The pain was associated with episodes of melena and multiple bouts of hematemesis. There was no history of abdominal trauma, prior abdominal surgery, or known chronic gastrointestinal illness. The patient also reported reduced oral intake and generalized weakness over

the preceding few days.On examination, the patient appeared ill and hemodynamically borderline stable with mild tachycardia. Abdominal examination revealed diffuse tenderness without guarding or rigidity. Bowel sounds were reduced. No palpable mass or organomegaly was identified. Digital rectal examination confirmed the presence of melena.

Laboratory investigations demonstrated leukocytosis (19,000cells/µL; normal total leukocyte count: 4,000-11,000 cells/µL) and elevated serum lactate levels (2.8mmol/L; normal: 0.5-2.0 mmol/L), suggestive of metabolic acidosis. Hemoglobin was reduced (7.8 g/dL; normal: 13.5-17.5 g/dL), correlating with the history of gastrointestinal bleeding. Renal function tests showed mild elevation of serum creatinine (1.8 mg/dL; normal: 0.7-1.3 mg/dL).

Given the constellation of progressive abdominal pain, gastrointestinal bleeding and disproportionate clinical findings, a high index of suspicion for acute mesenteric ischemia was raised. An emergency contrast-enhanced computed tomography (CECT) of the abdomen was performed to evaluate the mesenteric vasculature and bowel viability.

Contrast-enhanced computed tomography (CECT) of the abdomen was performed using a dedicated mesenteric angiography protocol. Imaging included a non-contrast phase followed by early arterial phase acquisition at 22 seconds and portal venous phase at 70 seconds after contrast administration. Non-ionic iodinated contrast was administered intravenously at a dose of 2 mL/kg with an injection rate of 4-5 mL/s. Scan coverage extended from the diaphragmatic domes to below the level of the symphysis pubis. Multiplanar reformatted images were obtained to facilitate optimal evaluation of the mesenteric vasculature and bowel loops.

Imaging revealed multiple dilated jejunal loops with air-fluid levels (maximum diameter ~4.2 cm). The distal jejunal and ileal loops demonstrated reduced mural enhancement along the mesenteric border with multiple intramural air foci, consistent with pneumatosis intestinalis (FIGURE-1).

Associated mesenteric fat stranding, engorged mesenteric veins, and minimal inter-bowel free fluid were noted (FIGURE-3), suggestive of mesenteric venous congestion. Overall features were indicative of acute mesenteric ischemia, likely secondary to mesenteric venous thrombosis, consistent with non viable bowel.

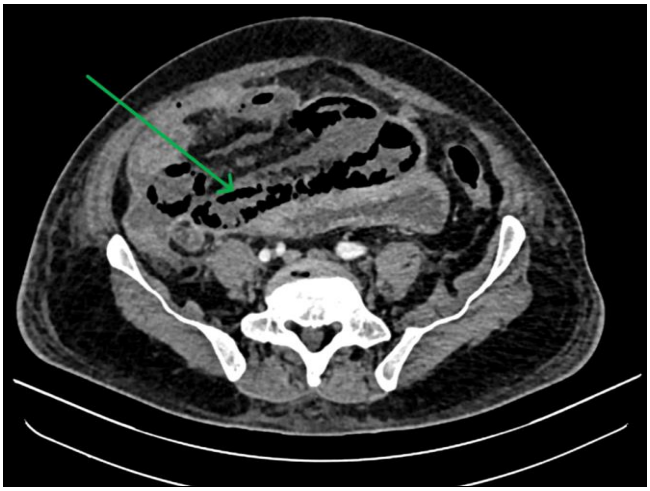

Fig 1: Axial Contrast Enhanced Computed Tomography of abdomen in arterial phase shows intramural gas (Green arrow) within the bowel wall, appearing as linear and cystic lucencies consistent with pneumatosis intestinalis

In the venous phase, an extensive non-opacified intraluminal thrombus was seen within the superior mesenteric vein (SMV) and its tributaries, with an average attenuation of approximately 23 HU, causing near-complete occlusion of the SMV. The thrombus was noted to extend into the portal vein up to the porta hepatis, resulting in partial to near-complete luminal occlusion (FIGURE-2).

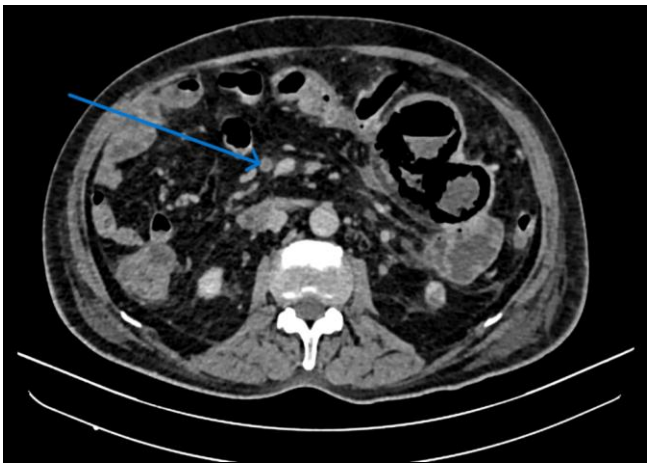

Fig 2: Axial contrast-enhanced Computed tomography image acquired in the venous phase demonstrates non-opacification of the superior mesenteric vein, which appears as a filling defect (blue arrow) with absent intraluminal contrast enhancement, consistent with superior mesenteric vein thrombosis

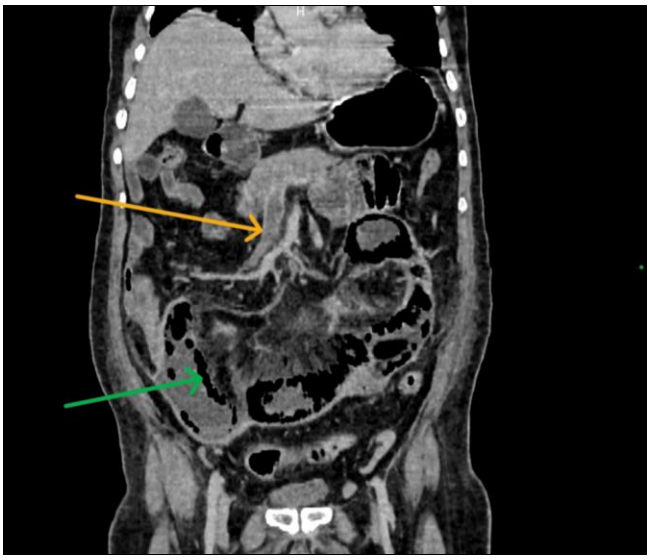

Fig 3: Coronal reformatted contrast-enhanced image obtained in the venous phase demonstrates linear and cystic foci of intramural gas within the bowel wall, consistent with pneumatosis intestinalis (green arrow). Additionally, there is non-opacification of the superior mesenteric vein, seen as absence of contrast enhancement within its expected course, consistent with superior mesenteric vein thrombosis (orange arrow)

These imaging findings were consistent with acute mesenteric ischemia secondary to superior mesenteric venous thrombosis with associated ischemic changes in the jejunal and ileal loops.

In view of imaging evidence of bowel ischemia and impending infarction, the patient was taken up for emergency exploratory laparotomy. Intraoperatively, segments of the jejunum and ileum were found to be dusky, edematous, and non-viable, with a clear demarcation from adjacent viable bowel (Figure 4). The resected specimen

measured approximately 65 cm in length, corresponding to the gangrenous segment identified intraoperatively, and is depicted in (Figure 5). The affected bowel was resected with adequate margins, ensuring preservation of well-perfused, viable ends. A primary end-to-end anastomosis was performed after confirming satisfactory vascularity and absence of tension at the anastomotic site. Thorough peritoneal lavage was carried out, and the abdomen was closed in layers with placement of appropriate drainage

The postoperative period was uneventful, and the patient remained hemodynamically stable with no immediate complications. Bowel function gradually improved with supportive care.

On follow-up, the patient reported decreased appetite and weight loss but remained clinically stable with no evidence of recurrent ischemic symptoms or postoperative complications.

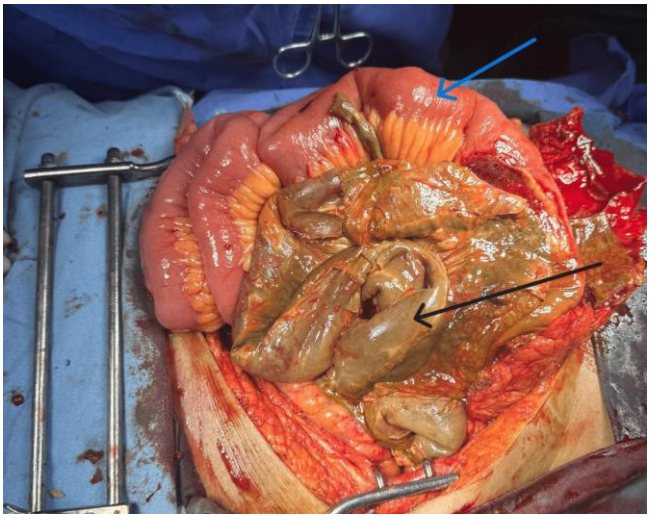

Fig 4: Intraoperative photograph obtained during exploratory laparotomy demonstrates a normally perfused small bowel loop with preserved pink serosal color and sheen (blue arrow), in contrast to an adjacent pathological bowel segment showing dusky brown-black discoloration, loss of normal serosal sheen, edema, and transmural necrosis (black arrow). The findings are consistent with ischemic and non-viable bowel in a case of acute mesenteric ischemia.

Fig 5: Gross specimen of resected bowel showing diffuse dusky discoloration and necrotic changes, consistent with ischemic non-viable intestine.

Discussion

Mesenteric venous thrombosis (MVT) is characterized by progressive impairment of venous drainage, resulting in bowel wall congestion and gradual compromise of microcirculatory perfusion. Unlike arterial insufficiency, the persistence of arterial inflow in MVT leads to increased intramural pressure, which ultimately culminates in reduced capillary perfusion and transmural ischemia if not promptly addressed [1]. The evolution of ischemia in this setting is therefore governed by hemodynamic imbalance rather than abrupt vascular occlusion [2].

The clinical trajectory of MVT is often protracted, contributing to delayed diagnosis and advanced disease at presentation. In the present case, the history of prolonged abdominal pain accompanied by gastrointestinal bleeding reflects progressive mucosal injury and loss of bowel wall integrity. Such manifestations indicate advanced ischemic insult and correlate with the presence of non-viable bowel on imaging and intraoperative assessment [3]. The absence of early peritoneal signs further highlights the deceptive nature of this entity, wherein significant pathology may exist despite relatively subtle clinical findings [4].

Multidetector computed tomography (MDCT) plays a decisive role in identifying both the primary vascular pathology and its downstream effects. The detection of a non-enhancing intraluminal thrombus within the superior mesenteric vein, with extension into the portal venous system as demonstrated in this case, signifies extensive venous involvement and is associated with increased risk of bowel infarction [5]. Evaluation in the venous phase remains critical for accurate depiction of venous thrombosis and assessment of disease extent [6].

Beyond direct visualization of thrombus, secondary imaging findings provide crucial insight into bowel viability. Mesenteric congestion, manifested by fat stranding, venous engorgement, and inter-bowel fluid, reflects elevated venous pressure and impaired drainage [7]. Progressive bowel wall changes, including hypo-enhancement and dilatation, indicate worsening perfusion and impending infarction [8]. The presence of pneumatosis intestinalis in this patient represents a pivotal imaging marker of advanced ischemia, particularly when seen in conjunction with venous occlusion and reduced mural enhancement, strongly suggesting transmural necrosis [9].

The diagnostic performance of MDCT in such scenarios has been consistently validated, with high sensitivity and specificity enabling early and accurate detection of mesenteric ischemia and its complications [10]. Importantly, imaging not only establishes the diagnosis but also facilitates risk stratification by differentiating reversible ischemia from irreversible infarction [11]. This distinction is critical in guiding therapeutic decisions.

Management of MVT is inherently stage-dependent. While anticoagulation remains the mainstay in early or non-infarcted cases, the presence of imaging features indicative of irreversible ischemia necessitates urgent surgical intervention [2]. In this case, radiological evidence of bowel hypo-enhancement and pneumatosis intestinalis accurately predicted non-viable bowel, which was subsequently confirmed intraoperatively, with approximately 65 cm of gangrenous small bowel requiring resection. This strong radiological-surgical correlation underscores the reliability of CT in determining bowel viability and guiding operative planning.

The present case emphasizes the importance of integrating imaging findings with clinical assessment to enable timely decision-making. Recognition of advanced imaging features should prompt immediate surgical consultation, as delays can result in extensive bowel loss and increased morbidity

Conclusions

Mesenteric venous thrombosis is an important but often overlooked cause of acute mesenteric ischemia that may present with a subacute course and nonspecific clinical findings. This case emphasizes the critical role of contrast-enhanced computed tomography in early diagnosis by clearly demonstrating venous thrombosis, mesenteric congestion, and associated bowel ischemic changes such as hypoenhancement and pneumatosis intestinalis. Recognition of these characteristic imaging features is essential for prompt diagnosis, risk stratification, and timely management. Early radiologic identification can significantly influence clinical decision-making and improve outcomes in patients with this potentially fatal condition.

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