Section: Miscellaneous

Original Research Article

THE COLLATERALS THAT SAVED A LIFE: CHRONIC MESENTERIC ARTERIAL OCCLUSIVE DISEASE PRESENTING AS ACUTE MESENTERIC ISCHEMIA WITH EXTENSIVE SMALL BOWEL GANGRENE SECONDARY TO SUPERIOR MESENTERIC ARTERY THROMBOSIS

Hariprasatth M[1], Malarvizhi C[2], Rohith Kumar R[3], Mohammed Thaha S[4], Sahasyaa Adalarasan[4], Sachin Kumar M H[1], Malathi K[1]

[1]Postgraduate, Madras Medical College, Chennai, Tamil Nadu, India.
[2]Professor, Madras Medical College, Chennai, Tamil Nadu, India.
[3]Assistant Professor, Madras Medical College, Chennai, Tamil Nadu, India.
[4]Medical Student, Madras Medical College, Chennai, Tamil Nadu, India.

Received : 14/04/2026
Received in revised form : 02/06/2026
Accepted : 18/06/2026

Keywords:
Superior mesenteric artery thrombosis, Acute mesenteric ischemia, Small bowel gangrene, Chronic mesenteric ischemia, Bowel resection, Jejunostomy, Ileostomy, Diversion colitis, Mesenteric vascular disease, Intestinal ischemia.

Corresponding Author:
Sahasyaa Adalarasan,
Email: surgeonshasyaa@gmail.com

DOI: 10.47009/jamp.2026.8.4.32

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2026; 8 (4); 168-172

ABSTRACT

Superior mesenteric artery (SMA) thrombosis is an uncommon but potentially fatal cause of acute mesenteric ischemia that may rapidly progress to bowel gangrene and perforation. A 38-year-old male presented with abdominal pain, vomiting, and obstipation of five days duration. Contrast-enhanced computed tomography (CECT) of the abdomen demonstrated partial thrombosis at the origin of the SMA, dilated proximal jejunal and ileal loops, pneumatosis intestinalis, and features suggestive of mid-ileal perforation. Emergency exploratory laparotomy revealed extensive gangrenous and necrotic segments of the small bowel requiring resection with proximal jejunostomy and distal ileostomy. Histopathological examination of resected small bowel confirmed acute vascular insufficiency with transmural hemorrhage and ischemic changes. The patient initially improved with postoperative enteral refeeding and supportive care. However, he was subsequently readmitted with recurrent abdominal pain, prompting repeat imaging, which demonstrated complete occlusion of the proximal SMA, near-total occlusion of the celiac trunk, and extensive collateral vessel formation. During follow-up, persistent weight loss and recurrent abdominal symptoms prompted colonoscopic evaluation, which revealed diversion colitis and multiple ileal ulcers. Histopathological examination and Cartridge-Based Nucleic Acid Amplification Test (CBNAAT) excluded inflammatory bowel disease and intestinal tuberculosis. Following nutritional optimization and multidisciplinary evaluation, the patient was planned for restoration of bowel continuity. This case highlights the role of extensive mesenteric collateral circulation in sustaining bowel viability despite progressive chronic mesenteric arterial occlusive disease, the importance of prompt surgical intervention in acute SMA thrombosis, and the value of postoperative distal limb refeeding and nutritional optimization in facilitating successful bowel rehabilitation and restoration of intestinal continuity.

INTRODUCTION

Chronic Mesenteric Arterial Occlusive Disease, also known as Chronic Mesenteric Ischemia (CMI), is a progressive manifestation of peripheral vascular disease characterized by insufficient blood flow to meet the metabolic demands of visceral organs, primarily the gastrointestinal tract. It is most commonly caused by atherosclerotic narrowing of the mesenteric vessels, particularly the superior mesenteric artery (SMA). Key risk factors include smoking, hyperlipidemia, diabetes, and hypertension.[1]

CMI may present with episodes of postprandial abdominal pain, referred to as "abdominal angina," occurring 15 to 30 minutes after eating and lasting up to 4 hours. However, nonspecific symptoms frequently associated with longstanding mesenteric ischemia, including nausea, vomiting, early satiety, diarrhea, or constipation, make CMI difficult to differentiate from other causes of abdominal pain.[2] This hallmark symptom often leads to a fear of eating, resulting in significant weight loss.[3]

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Acute mesenteric ischemia is a life-threatening medical emergency caused by a sudden blockage or critical reduction in blood flow to the intestines. Without prompt restoration of blood flow, it can lead to irreversible bowel injury, sepsis, and death.[4] Ischemic bowel disease is uncommon and may occur due to acute or chronic conditions. Acute intestinal ischemia can result from arterial occlusion, venous thrombosis, vasculitis, embolism, or non-occlusive disease. Chronic intestinal ischemia, also known as abdominal angina, is usually associated with atherosclerotic vascular disease.[5] Extensive small bowel gangrene is a serious complication that occurs when a large segment of the intestine loses its blood supply and becomes non-viable.

In this case, chronic mesenteric arterial occlusive disease remained clinically silent because of well-developed collateral circulation. However, acute thrombosis of the superior mesenteric artery led to bowel ischemia and extensive gangrene, requiring emergency surgical intervention. This case highlights the importance of early recognition and timely management of mesenteric ischemia to prevent life-threatening complications.

Case Presentation

A 38-year-old male presented with abdominal pain, non-bilious vomiting containing food particles, and obstipation for five days. On examination, the abdomen was distended with diffuse tenderness and guarding. In view of suspected bowel ischemia, contrast-enhanced computed tomography (CECT) of the abdomen was performed, which demonstrated partial thrombosis at the origin of the superior mesenteric artery (SMA), dilated proximal jejunal and ileal loops, pneumatosis intestinalis involving the distal ileum, and features suggestive of perforation of the mid-ileal loops (Figure 1). With these findings, a diagnosis of acute mesenteric ischemia secondary to SMA thrombosis with bowel gangrene was made.

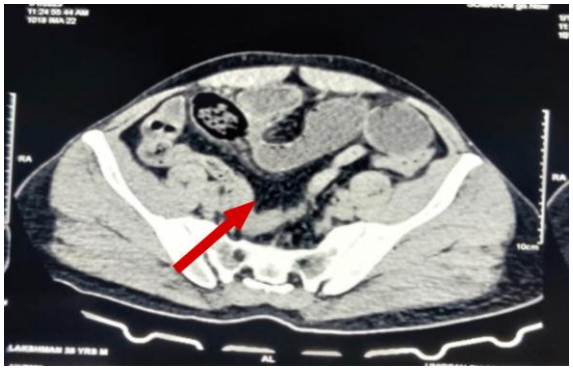

Figure 1: Contrast-enhanced computed tomography demonstrating features suggestive of perforation of the mid-ileal loops (red arrow).

The patient underwent an emergency exploratory laparotomy. Intraoperatively, dilated small bowel loops were identified from the duodenojejunal flexure up to the mid ileum. Multiple focal necrotic patches were present beginning approximately 30 cm distal to the duodenojejunal flexure and extending for about 30 cm. This was followed by approximately 100 cm of completely gangrenous small bowel (Figure 2). Additional focal necrotic patches were noted in the mid and distal ileum over a further length of approximately 30 cm, while the remaining distal ileum up to the ileocecal junction appeared viable. A Meckel's diverticulum was also identified approximately two feet proximal to the ileocecal junction. Resection of the gangrenous bowel was performed, and because of the extent of ischemic injury and concern regarding bowel viability, restoration of continuity was deferred. A proximal jejunostomy and distal ileostomy were created.

Figure 2: Intraoperative specimen showing approximately 100 cm of gangrenous small intestine resected during emergency laparotomy.

Histopathological examination of the resected bowel demonstrated acute vascular insufficiency with transmural hemorrhage. One resection margin showed congestion, while the opposite margin showed superficial mucosal ischemic changes, confirming ischemic bowel injury secondary to vascular compromise. Postoperatively, the patient received supportive care and enteral refeeding through stomas. The output from the proximal jejunostomy was collected and reintroduced into the distal ileostomy to allow nutrient and fluid absorption through the remaining bowel (Figure 3). The patient showed gradual clinical improvement and was discharged in a stable condition His symptoms improved, and he was discharged in a stable condition.

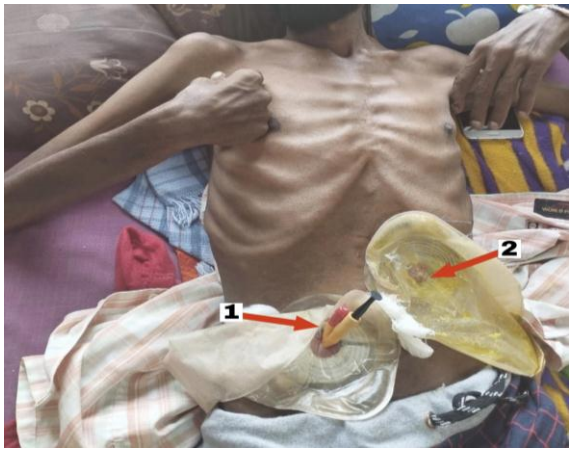

Figure 3: Clinical photograph obtained during postoperative recovery showing the proximal jejunostomy (2) and distal ileostomy (1).

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Approximately six weeks later, the patient was readmitted with diffuse abdominal pain of three days duration. Physical examination revealed diffuse abdominal tenderness without guarding or rigidity. In view of recurrent abdominal pain following bowel resection for mesenteric ischemia, repeat CECT abdomen was performed to evaluate for recurrent ischemia or postoperative complications. Imaging demonstrated complete occlusion of the proximal SMA, near-total occlusion of the celiac trunk by thrombus, and extensive collateral vessel formation (Figure 4). Ostial stenosis of the right renal artery and an accessory renal artery were also noted. The inferior mesenteric artery remained patent and contributed to multiple collateral channels supplying the mesenteric circulation. During evaluation, computed tomography of the chest demonstrated pneumomediastinum. Cardiothoracic surgery, vascular surgery, cardiology, and thoracic medicine consultations were obtained. As no evidence of bowel obstruction, perforation, or progressive ischemia was identified, the patient was managed conservatively and discharged following symptomatic improvement.

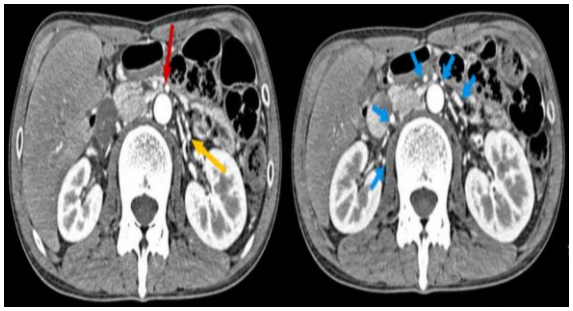

Figure 4: Contrast-enhanced computed tomography showing near-total occlusion of the celiac trunk (red arrow), complete occlusion of the proximal superior mesenteric artery (yellow arrow), and extensive collateral vessel formation (blue arrows).

Despite enteral refeeding, the patient subsequently developed progressive weight loss and recurrent abdominal pain, with body weight decreasing to 32 kg. In view of persistent symptoms and significant weight loss, colonoscopic evaluation was performed to investigate possible inflammatory, infectious, or ischemic pathology. Colonoscopy revealed diversion colitis and multiple ileal ulcers. Histopathological examination of the biopsy specimens demonstrated chronic inflammatory changes. Because of the presence of ileal ulceration and ongoing weight loss, inflammatory bowel disease and intestinal tuberculosis were considered in the differential diagnosis. Repeat colonoscopy demonstrated an ulcer at the ileocecal junction. Histopathological examination showed no evidence of cryptitis or crypt abscess formation, and Cartridge-Based Nucleic Acid Amplification Test (CBNAAT) was negative for tuberculosis. These findings excluded inflammatory bowel disease and intestinal tuberculosis. The patient's symptoms were therefore attributed to the consequences of extensive bowel resection, chronic mesenteric vascular disease, and diversion colitis. Following nutritional optimization and multidisciplinary assessment, he was planned for stoma reversal and restoration of bowel continuity.

Although the patient initially presented with acute mesenteric ischemia secondary to superior mesenteric artery thrombosis, the subsequent demonstration of complete proximal superior mesenteric artery occlusion, near-total celiac trunk occlusion, and extensive collateral vessel formation suggested the presence of underlying chronic mesenteric arterial occlusive disease. The development of extensive collateral circulation indicates a gradual and longstanding reduction in mesenteric blood flow, allowing alternative vascular channels to form over time. While these collaterals were insufficient to completely prevent intestinal ischemia and extensive small bowel gangrene, they likely preserved perfusion to a significant portion of the remaining bowel and prevented catastrophic infarction of the entire mesenteric territory. The patient's survival despite severe occlusive disease involving two major mesenteric vessels supports the protective role of these collateral pathways. Thus, this case likely represents previously unrecognized chronic mesenteric arterial occlusive disease that acutely decompensated following superior mesenteric artery thrombosis, resulting in acute mesenteric ischemia and bowel gangrene.

DISCUSSION

Acute mesenteric ischemia is a life-threatening condition characterized by a sudden reduction or interruption of intestinal blood flow due to arterial occlusion, embolism, venous thrombosis, vasculitis, or non-occlusive causes, whereas chronic intestinal ischemia (abdominal angina) typically results from progressive atherosclerotic mesenteric vascular disease and may ultimately lead to bowel infarction, sepsis, and death if untreated.[1-5]

A previous study reported that chronic mesenteric ischemia (CMI) remains relatively uncommon despite the frequent presence of mesenteric arterial stenosis. The likelihood of developing CMI increased with the severity and number of diseased mesenteric vessels, occurring in 16% of patients with single-vessel atherosclerotic stenosis and 81% of those with two- or three-vessel disease.[6] The discrepancy between the high prevalence of arterial disease and the low incidence of symptoms is largely attributed to the extensive collateral circulation of the mesenteric vascular system.

Previous studies have demonstrated that clinically significant mesenteric ischemia may occur even with single-vessel involvement, while some patients with stenosis or occlusion of two mesenteric vessels remain asymptomatic for prolonged periods due to adequate collateral perfusion. Furthermore, stenosis of either the celiac artery (CA) or superior mesenteric

ISSN (O): 2687-5365; ISSN (P): 2753-6556

artery (SMA) may result in compensatory increases in blood flow through unaffected mesenteric vessels secondary to collateral network development.[7] A small human study evaluating patients with SMA occlusion reported increased blood flow through the inferior mesenteric artery (IMA) in all cases, further supporting the adaptive role of collateral circulation in maintaining intestinal perfusion.[8]

The mesenteric circulation possesses an extensive collateral network that provides alternative pathways for blood flow when major mesenteric arteries become stenosed or occluded. Important collateral channels include the pancreaticoduodenal arcade connecting the celiac artery and SMA, as well as the marginal artery of Drummond and the arc of Riolan linking the SMA and IMA.[9] This collateral network forms the foundation of chronic mesenteric ischemia pathophysiology. Because of this built-in redundancy, significant symptoms usually develop only when two or more of the three major mesenteric arteries become critically stenosed or occluded.[10]

Our case illustrates the protective role of these collateral pathways (Figure 5). The presence of well-developed collateral circulation likely maintained intestinal viability despite progressive mesenteric arterial occlusive disease and delayed the onset of catastrophic ischemia. However, acute thrombosis superimposed on chronic arterial disease ultimately overwhelmed these compensatory mechanisms, resulting in acute mesenteric ischemia. The extensive collateral circulation may also explain the patient's survival despite severe SMA thrombosis and extensive bowel ischemia.

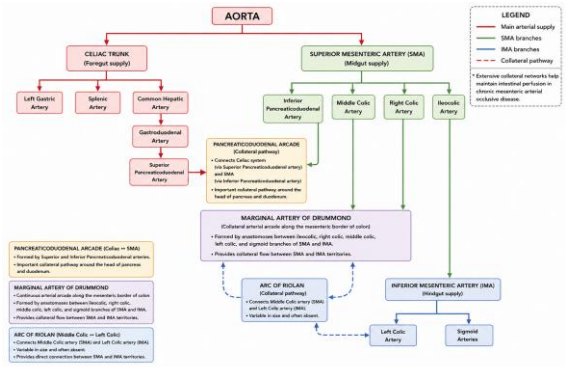

Figure 5: Schematic representation of the major mesenteric arterial collateral pathways, including the pancreaticoduodenal arcade, marginal artery of Drummond, and arc of Riolan.

Mesenteric ischemia predominantly affects older adults, with peak incidence occurring in the sixth and seventh decades of life and a median age of presentation of approximately 70 years.[1] In contrast, our patient was only 38 years old. The occurrence of chronic mesenteric arterial occlusive disease at such a young age is unusual and raises consideration of accelerated atherosclerosis, undetected prothrombotic states, vasculitis, or other non-traditional vascular risk factors. However, no definitive underlying etiology could be established in our patient.

Diagnosis of mesenteric arterial occlusion requires a high index of clinical suspicion, as patients classically present with severe abdominal pain that appears disproportionate to physical examination findings. Computed tomographic angiography (CTA) remains the diagnostic modality of choice because it rapidly and accurately identifies mesenteric arterial occlusion, bowel ischemia, and associated vascular abnormalities.[11] In our patient, CTA was crucial in establishing the diagnosis and delineating the extent of vascular involvement.

Management of mesenteric ischemia complicated by bowel gangrene constitutes a surgical emergency. The primary objectives are restoration of mesenteric blood flow when feasible and resection of all non-viable bowel to prevent peritonitis, sepsis, and death.[12] Our patient underwent emergency surgical intervention with resection of gangrenous bowel, resulting in survival despite the severity of disease.

Refeeding is the process of collecting effluent from a functioning proximal stoma and re-infusing it into the distal bowel through a mucous fistula or distal stoma, thereby mimicking normal intestinal continuity. This technique facilitates the reabsorption of fluids, electrolytes, bile salts, and nutrients, promotes intestinal adaptation, and reduces the complications associated with high-output stomas and prolonged parenteral nutrition. In addition, refeeding is a simple and cost-effective strategy that decreases nutritional losses and healthcare expenditure.[13]

In our patient, primary intestinal anastomosis was deferred because of extensive bowel ischemia, bowel edema, contamination, and the patient's critical clinical condition, all of which would have increased the risk of anastomotic leak and postoperative morbidity. Therefore, a proximal jejunostomy and distal ileostomy were created, and effluent from the proximal jejunostomy was collected and re-infused into the distal ileostomy. This enabled utilization of the remaining bowel length, improved nutrient and fluid absorption, and promoted distal bowel adaptation during recovery. Following clinical stabilization, nutritional optimization, and confirmation of bowel viability, definitive restoration of intestinal continuity was successfully achieved through stoma reversal and re-anastomosis of the bowel.

This case highlights the protective role of collateral mesenteric circulation in chronic mesenteric arterial occlusive disease. Although collateral vessel development may delay the onset of intestinal ischemia, acute thrombosis of a chronically diseased mesenteric artery can rapidly overwhelm these compensatory pathways and lead to life-threatening acute bowel ischemia. Early recognition, prompt vascular imaging, and timely surgical management remain essential for improving outcomes in these patients.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

CONCLUSION

Superior mesenteric artery thrombosis is a life-threatening cause of acute mesenteric ischemia that can rapidly progress to bowel gangrene, perforation, and death if diagnosis and treatment are delayed. Early recognition, prompt radiological evaluation, and timely surgical intervention are essential to improve outcomes. Long-term follow-up remains important because patients may develop nutritional deficiencies, chronic mesenteric ischemia, and stoma-related complications following extensive bowel resection.

This case highlights the occurrence of acute SMA thrombosis in a young patient with underlying chronic mesenteric arterial occlusive disease involving both the SMA and celiac trunk. Despite severe mesenteric vascular compromise, extensive collateral circulation likely contributed to survival and preservation of the remaining bowel. The case also emphasizes the importance of postoperative nutritional rehabilitation, including refeeding through stomal opening, and careful evaluation of persistent gastrointestinal symptoms before restoration of bowel continuity.

REFERENCES

1. Patel R, Waheed A, Kimyaghalam A, et al. Chronic Mesenteric Ischemia. [Updated 2025 Jan 22]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan-. https://www.ncbi.nlm.nih.gov/books/NBK430748/
2. Prakash VS, Marin M, Faries PL. Acute and Chronic Ischemic Disorders of the Small Bowel. Curr Gastroenterol Rep. 2019 May 7;21(6):27. doi: 10.1007/s11894-019-0694-5. PMID: 31065817.
3. Allain C, Besch G, Guelle N, Rinckenbach S, Salomon du Mont L. Prevalence and Impact of Malnutrition in Patients Surgically Treated for Chronic Mesenteric Ischemia. Ann Vasc Surg. 2019 Jul;58:24-31. doi: 10.1016/j.avsg.2019.02.009. Epub 2019 Apr 19. PMID: 31009732.
4. Zafer S, Lopez RA, Kimyaghalam A. Acute Mesenteric Ischemia. [Updated 2026 May 13]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan-. https://www.ncbi.nlm.nih.gov/books/NBK431068/
5. Tyson RL. Diagnosis and treatment of abdominal angina. Nurse Pract. 2010 Nov;35(11):16-22; quiz 22-3. doi: 10.1097/01.NPR.0000388938.08875.99. PMID: 20935581.
6. Terlouw LG, Verbeten M, van Noord D, Brusse-Keizer M, Beumer RR, Geelkerken RH, Bruno MJ, Kolkman JJ; Dutch Mesenteric Ischemia Study Group. The Incidence of Chronic Mesenteric Ischemia in the Well-Defined Region of a Dutch Mesenteric Ischemia Expert Center. Clin Transl Gastroenterol. 2020 Aug;11(8):e00200. doi: 10.14309/ctg.0000000000000200. PMID: 32955192; PMCID: PMC7431271.
7. van Petersen AS, Kolkman JJ, Meerwaldt R, Huisman AB, van der Palen J, Zeebregts CJ, et al. Mesenteric stenosis, collaterals, and compensatory blood flow. J Vasc Surg. 2014 Jul;60(1):111-9.e2. doi: 10.1016/j.jvs.2014.01.063.
8. Erden A, Yurdakul M, Cumhur T. Doppler waveforms of the normal and collateralized inferior mesenteric artery. AJR Am J Roentgenol. 1998 Sep;171(3):619-27. doi: 10.2214/ajr.171.3.9725285. PMID: 9725285.
9. Hohenwalter EJ. Chronic mesenteric ischemia: diagnosis and treatment. Semin Intervent Radiol. 2009 Dec;26(4):345-51. doi: 10.1055/s-0029-1242198. PMID: 21326544; PMCID: PMC3036470.
10. Walker TG. Mesenteric vasculature and collateral pathways. Semin Intervent Radiol. 2009 Sep;26(3):167-74. doi: 10.1055/s-0029-1225663. PMID: 21326561; PMCID: PMC3036491.
11. Franca E, Shaydakov ME, Kosove J. Mesenteric Artery Thrombosis. [Updated 2023 May 2]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan-. https://www.ncbi.nlm.nih.gov/books/NBK539763/
12. Haglund U. Mesenteric ischemia. In: Holzheimer RG, Mannick JA, editors. Surgical Treatment: Evidence-Based and Problem-Oriented. Munich: Zuckschwerdt; 2001. https://www.ncbi.nlm.nih.gov/books/NBK6883/
13. Nagar A, Mehrotra S, Yadav A, Mangla V, Lalwani S, Mehta N, Nundy S. Distal Bowel Re-feeding in Patients with Proximal Jejunostomy. J Gastrointest Surg. 2018 Jul;22(7):1251-1257. doi: 10.1007/s11605-018-3752-7. Epub 2018 May 18. PMID: 29777456.

ISSN (O): 2687-5365; ISSN (P): 2753-6556