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Multidetector CT Evaluation of Acute Mesenteric Ischemia: A Case Series with Radiological–Clinical Correlation

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ABSTRACT

Acute mesenteric ischemia (AMI) represents a critical abdominal emergency with significant mortality, often related to delayed recognition. Cross-sectional imaging, particularly contrast-enhanced multidetector CT (MDCT), is essential for timely diagnosis and therapeutic decision-making. Here we describe a case series of 3 patientspresenting with acute abdominal symptoms and clinical suspicion of mesenteric ischemia who when underwent contrast-enhanced CT showed features of mesenteric ischemia.

Keywords: *Acute mesenteric ischemia; Multidetector CT.*

INTRODUCTION

Acute Mesenteric Ischemia (AMI) is a catastrophic abdominal emergency characterized by a sudden decline in intestinal blood flow causing vascular compromise of the bowel and its mesentery in the acute setting.[1] Early imaging findings included altered bowel wall enhancement and mesenteric congestion, while advanced disease demonstrated pneumatosis intestinalis and portal venous gas, often indicating transmural infarction[2]. CT angiography with arterial ,portal and venous phase reliably delineated vascular pathology and aided in etiological classification[4]. This case series presents a diverse spectrum of AMI presentations encountered at our institution. By evaluating these distinct scenarios, this paper aims to review the essential radiological hallmarks of arterial, venous, and non-occlusive mesenteric ischemia, emphasizing the imaging findings in each[1,2,4].

MATERIALS AND METHODS:

Three adult patients undergoing diagnostic evaluation with acute abdominal symptoms and suspicion of ischemia, between January 2025 and February 2026 were retrospectively reviewed. All patients underwent either contrast-enhanced CT, imaging findings were correlated with surgical findings when available.

RESULTS:

Case series

Case 1: Acute Arterial Mesenteric Ischemia

A 56-year-old male patient presented with severe abdominal pain of three days' duration. Contrast-enhanced MDCT of the abdomen and pelvis demonstrated long-segment dilatation of the mid-ileal loops involving approximately 20 cm of bowel, with a maximum diameter of 3.9 cm and features of pneumatosis intestinalis involving the mid ileal segment .CT angiography demonstrated thrombosis involving the segmental branches of the superior mesenteric artery supplying the affected bowel segment. The imaging findings were consistent with acute arterial mesenteric ischemia involving the segmental branches of superior mesenteric artery with bowel infarction**.** The patient underwent emergency exploratory laparotomy with resection of the non-viable bowel segment. Operative findings correlated well with the CT diagnosis.

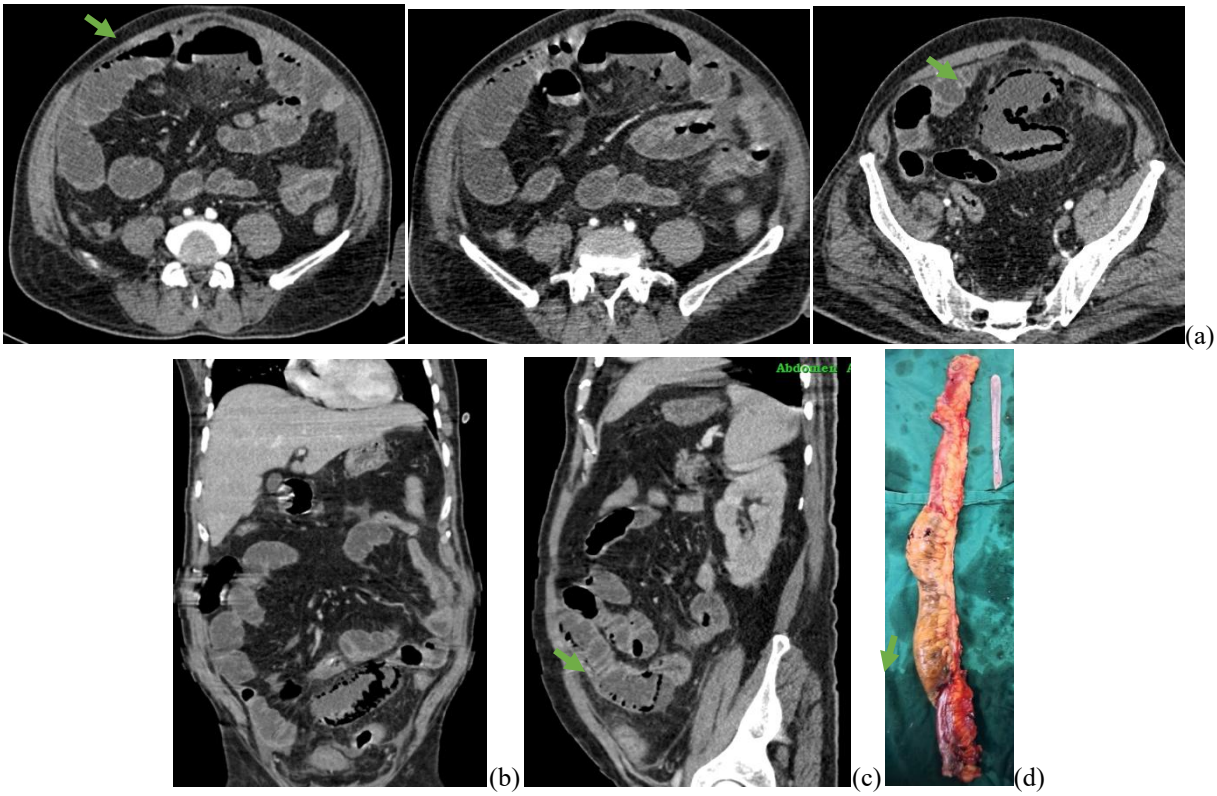

Figure 1 : CECT of abdomen and pelvis.Axial serial sections arterial phase (a) , coronal section (b),sagittal section (c) showing dilated small bowel loops in the left paraumbiliacal region with thinning of bowel wall and intramural air(suggestive of pneumatosisintestinalis) ,no enhancement. Adjacent mesenteric fat stranding and mild fluid noted. (d) Post surgical specimen showing non viable bowel segment post resection after exploratory laparotomy

Case 2: Acute Mesenteric Venous Ischemia

27 year old male patient with history of chronic liver disease with portal hypertension,and suspicion of acute mesenteric ischemia. CECT abdomen and pelvis showed dilated portal vein (measures ~ 23 mm in caliber) with focal partial filling defect (measuring about 2.1 x 1.4 x 3.3 cm - Transverse x Anteroposterior x Craniocaudal) noted in the proximal portal vein near the confluence and filling defect is also noted in SMV and its branches and distal splenic vein extending to the confluence . The small bowel loops showed mural wall thickening (~ 9-10 mm in the ileal loops and ~ 10-12mm in the jejuna loops) with edema , decreased enhancement – likely due to congestion. Diffuse mesenteric fat stranding and congestion noted with prominent vessels in the mesentery – likely mesenteric collaterals - suggestive of acute mesenteric venous ischemia due to mesenteric venous thrombosis predominantly involving the superior mesenteric vein.

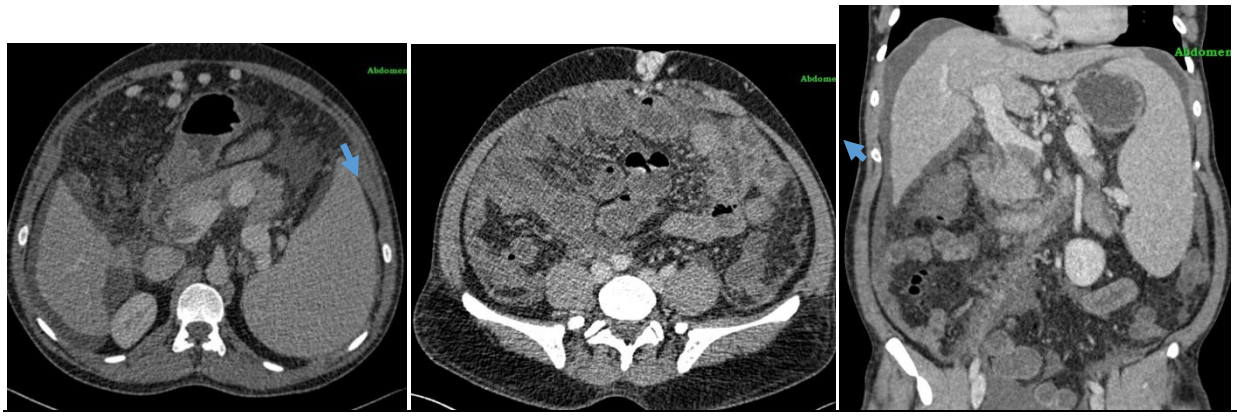

Figure 2: Axial section of CECT abdomen,venous phase (a) & (b) and coronal section (c). (a): Dilated portal vein with focal partial filling defect in the proximal portal vein near the confluence - Partial portal vein thrombosis at the confluence and SMV thrombosis (b) with small bowel wall thickening, edema and mesenteric edema – s/o acute mesenteric venous ischemia.(c)Massive Splenomegaly and ascites

Case 3: Non-Occlusive Mesenteric Ischemia

54 year old male with low output cardiac status, presented with abdominal pain and vomiting. CECT abdomen and pelvis showed long segment over a length of 25-30cm circumferential thickening involving the proximal jejunum (maximum wall thickness measuring 3.8mm). with mild hypoenhancement of the walls associated mesenteric edema and venous engorgement. No thrombosis in SMA/SMV suggesting non occlusive mesenteric ischemia, likely secondary to low cardiac output state.

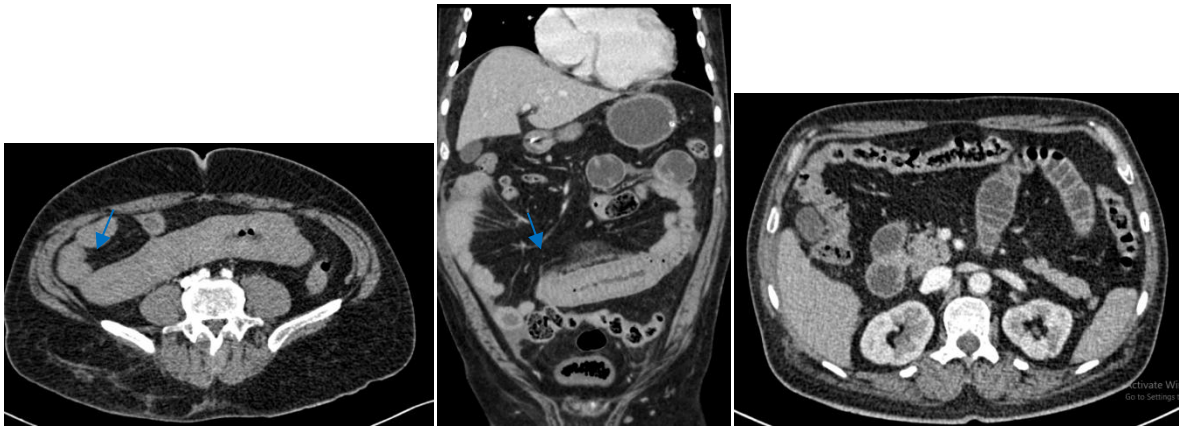

Figure 3: Axial section of CECT abdomen, arterial phase (a) and coronal section (b): Dilated duodenum, proximal jejunum long segment circumferential thickening involving the proximal jejunum over a length of 25-30cm with mild hypoenhancement of the walls. (c) demonstrates a patent superior mesenteric artery and superior mesenteric vein without evidence of thrombosis .

DISCUSSION:

AMI results from a sudden reduction in intestinal blood flow leading to inadequate oxygen delivery and subsequent bowel injury. Depending on the underlying vascular compromise, AMI is classified into arterial occlusive ischemia, mesenteric venous ischemia, and non-occlusive mesenteric ischemia (NOMI). Multidetector computed tomography (MDCT), when performed with arterial and portal venous phase acquisition, is currently considered the imaging modality of choice for the diagnosis of AMI. Its ability to simultaneously evaluate mesenteric vasculature, bowel wall perfusion, mesentery, and associated abdominal organs enables rapid identification of both the etiology and severity of ischemia. A systematic review and meta-analysis by Menke reported a pooled sensitivity of approximately 93% and specificity of 96% for multidetector CT in the diagnosis of acute mesenteric ischemia, highlighting its excellent diagnostic performance.[4] Arterial occlusion causes abrupt interruption of arterial inflow, resulting in bowel hypoperfusion and rapid progression to transmural infarction if untreated. In contrast, mesenteric venous thrombosis impairs venous drainage, leading to increased capillary pressure, bowel wall edema, mesenteric congestion[6], and secondary reduction in arterial perfusion. NOMI develops despite patent mesenteric vessels and is generally related to prolonged splanchnic vasoconstriction in patients with severe systemic hypoperfusion, commonly seen in patients with low cardiac output, shock, or sepsis. Irrespective of the etiology, prolonged ischemia can result in bowel necrosis, perforation[5].

In our case series , Case 1 had arterial mesenteric ischemia surgical exploration with resection of non-viable bowel was done . Surgical management is indicated in the presence of bowel infarction, perforation, peritonitis, or CT findings suggestive of transmural necrosis such as pneumatosis intestinalis. In Case 2 which had venous thrombosis, treatment was systemic anticoagulation to prevent thrombus propagation and facilitate recanalization. Case 3 showed no evidence of vascular thrombosis , management was directed at reversal of the underlying low-flow state and restoration of mesenteric perfusion.

Summary table of Etiology, key CT Findings, and Management in our case series[7,8]

Case	Age/Sex	Etiology	CT Findings	Management
1	56/M	Arterial thrombosis	Pneumatosis intestinalis, absent enhancement, SMA branch thrombosis	Surgery
2	27/M	Venous thrombosis	SMV/PV thrombosis, bowel edema	Anticoagulation
3	54/M	NOMI	Patent vessels, hypoenhancing jejunum	Medical management

Key management differences[7]

Type	Primary Treatment	Role of Surgery
Arterial ischemia (Case 1)	Urgent revascularization + anticoagulation	If infarction/peritonitis present
Venous ischemia (Case 2)	Anticoagulation (first-line)	If infarction/perforation develops
NOMI (Case 3)	Correct low cardiac output/hypoperfusion ± vasodilators	If bowel necrosis develops

Our case series highlights the complementary role of MDCT in differentiating the major etiological subtypes of AMI. Identification of the underlying vascular abnormality, evaluation of bowel viability, and recognition of imaging signs suggestive of irreversible ischemia enable appropriate triage for surgical or medical management. The imaging findings observed in our patients were consistent with previously published literature demonstrating the high diagnostic accuracy of multidetector CT angiography in suspected acute mesenteric ischemia.

CONCLUSION:

MDCT serves as a cornerstone in the evaluation of suspected mesenteric ischemia, enabling early diagnosis, identification of the underlying cause and differentiation among arterial, venous, and non-occlusive etiologies.. Distinct vascular and bowel-wall imaging features permit early diagnosis, assessment of bowel viability, and detection of ischemic complications. Familiarity with imaging patterns is crucial for timely intervention and improved patient outcomes.

Conflict of Interest: None declared.

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