ORIGINAL RESEARCH PAPER
Volume - 15 | Issue - 09 | September - 2026 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

CLINICAL PROFILE, MANAGEMENT, AND OUTCOMES OF MESENTERIC ISCHEMIA: A PROSPECTIVE OBSERVATIONAL STUDY FROM A TERTIARY CARE CENTRE

General Surgery

Dr. Nikhil Chauhan — Assistant Professor, Dept. of General Surgery, MGM Medical College and Hospital, Chhatrapati Sambhajinagar

Dr. Rajendra Shinde — Professor, Dept. of General Surgery, MGM Medical College and Hospital, Chhatrapati Sambhajinagar

Dr. Ninad Patil — Junior Resident, Dept. of General Surgery, MGM Medical College and Hospital, Chhatrapati Sambhajinagar

ABSTRACT

Background: Acute mesenteric ischemia (AMI) is a life-threatening surgical emergency associated with high morbidity and mortality owing to its nonspecific clinical presentation and delayed diagnosis. Despite advances in imaging and management, outcomes remain poor, particularly in patients presenting with advanced disease. This study evaluated the clinical profile, diagnostic modalities, management strategies, and outcomes of patients with mesenteric ischemia treated at a tertiary care centre. **Methods:** A prospective observational study was conducted at MGM Medical College and Hospital, Chhatrapati Sambhajinagar, between May 2024 and April 2026. Twenty-six consecutive patients diagnosed with mesenteric ischemia were included. Demographic characteristics, clinical presentation, laboratory parameters including C-reactive protein (CRP), D-dimer and serum lactate, radiological findings, intraoperative observations, management strategies, postoperative complications, and clinical outcomes were analysed. Statistical analysis was performed using SPSS version 25.0, with a p-value <0.05 considered statistically significant. **Results:** Twenty-six patients were included during the study period. Most patients were males in the fifth and sixth decades of life. Abdominal pain was the universal presenting symptom, while vomiting and abdominal distension were the next most frequent complaints. Smoking, hypertension, and diabetes mellitus were the predominant associated risk factors and comorbidities. CRP and D-dimer were elevated in all patients, whereas serum lactate, although frequently elevated, did not demonstrate a significant association with mortality. Contrast-enhanced computed tomography was the principal diagnostic modality and demonstrated characteristic findings of mesenteric ischemia, facilitating treatment planning. The majority of patients required exploratory laparotomy with bowel resection because of advanced disease at presentation, while selected patients underwent endovascular intervention and anticoagulation. Sepsis was the commonest postoperative complication, followed by acute kidney injury and surgical site infection. The overall in-hospital mortality was 34.6%, with all deaths attributable to septic complications and multiorgan dysfunction. **Conclusion:** Acute mesenteric ischemia continues to be associated with substantial morbidity and mortality. Early clinical suspicion, prompt contrast-enhanced CT imaging, and timely multidisciplinary intervention remain the key determinants of favourable outcomes. The predominance of advanced disease at presentation in the present study highlights the need for strategies aimed at earlier diagnosis and expedited definitive management.

KEYWORDS

Acute mesenteric ischemia; bowel ischemia; contrast-enhanced computed tomography; exploratory laparotomy; bowel resection; outcomes.

INTRODUCTION

Acute mesenteric ischemia (AMI) is a life-threatening vascular emergency caused by an acute reduction in intestinal blood flow. Although uncommon, it remains one of the most lethal causes of acute abdomen, with reported mortality rates of 40–70% despite advances in diagnostic imaging, critical care, and surgical management [1,2,14-17]. AMI includes arterial embolism, arterial thrombosis, non-occlusive mesenteric ischemia, and mesenteric venous thrombosis, all of which may progress to irreversible bowel infarction if diagnosis and treatment are delayed [1,3,4,12,13].

Early diagnosis remains challenging because patients often present with nonspecific symptoms, and the classical finding of pain disproportionate to physical examination is inconsistently observed. Contrast-enhanced computed tomography (CECT) is the imaging modality of choice, while biomarkers such as C-reactive protein (CRP), D-dimer, and serum lactate may support diagnosis and prognostication but lack sufficient diagnostic accuracy when used alone [5,6,7,9-11,21].

Advances in endovascular therapy and multidisciplinary management have improved treatment strategies; however, outcomes remain poor, particularly in patients presenting with advanced bowel ischemia [12,13,18-20]. Prospective data from Indian tertiary care centres remain limited.

This prospective observational study was undertaken to evaluate the clinical profile, diagnostic modalities, management strategies, and outcomes of patients with mesenteric ischemia treated at a tertiary care teaching hospital, with the aim of contributing contemporary institutional data to support earlier diagnosis and improved management.

MATERIALS AND METHODS

Study Design and Setting

This prospective, single-centre observational study was conducted in the Department of General Surgery at MGM Medical College and Hospital, Chhatrapati Sambhajinagar, Maharashtra, India, over a two-year period from May 2024 to April 2026. The study protocol was approved by the Institutional Ethics Committee of MGM Medical College and Hospital (Approval No. MGM-ECRHS/2024/154) before commencement of the study. Written informed consent was obtained from all participants or their legally authorized representatives prior to enrolment.

Study Population

Patients presenting with unexplained abdominal pain and suspected of having mesenteric ischemia were prospectively screened for eligibility. Consecutive patients fulfilling the inclusion criteria and providing informed consent were enrolled during the study period.

Inclusion Criteria

- Patients presenting with unexplained abdominal pain, irrespective of correlation with local abdominal signs, who underwent radiological evaluation for suspected mesenteric ischemia.
- Patients of any age.
- Patients of either sex.
- Patients willing to provide written informed consent.

Exclusion Criteria

- Pregnant women.
- Patients with human immunodeficiency virus infection.

Sample Size

Mesenteric ischemia is an uncommon clinical entity; therefore, the study was designed as a time-bound prospective observational study rather than one based on a formal sample size calculation. All eligible patients presenting during the study period were included, resulting in a final sample size of 26 patients.

Data Collection

Clinical data were prospectively collected using a standardized study proforma. Demographic characteristics, presenting symptoms, comorbidities, clinical examination findings, laboratory investigations, radiological findings, management strategies, operative details, intraoperative findings, postoperative complications, and in-hospital outcomes were systematically recorded for each patient.

Diagnostic Evaluation
All patients underwent a detailed clinical evaluation followed by appropriate radiological investigations based on the treating surgeon's clinical judgment. Imaging modalities included ultrasonography, contrast-enhanced computed tomography (CECT) of the abdomen and pelvis, CT angiography, and digital subtraction angiography, where clinically indicated.

Biomarker Assessment
Routine haematological and biochemical investigations were performed in all patients. Serum C-reactive protein (CRP), serum lactate, and D-dimer levels were measured to evaluate their association with the diagnosis and prognosis of mesenteric ischemia.

Management
Management decisions were individualized according to the patient's clinical condition, laboratory findings, imaging findings, and intraoperative assessment. Treatment modalities included conservative management, anticoagulation, exploratory laparotomy with or without bowel resection, and other appropriate surgical procedures as indicated. Operative procedures and intraoperative findings were prospectively documented.

Outcome Measures
The primary outcome measures included the clinical profile, diagnostic findings, management strategies, postoperative complications, and in-hospital outcomes of patients with mesenteric ischemia. Secondary analyses evaluated the association of serum CRP, serum lactate, and D-dimer levels with the diagnosis and prognosis of mesenteric ischemia.

Statistical Analysis
Data were entered into Microsoft Office 365 and analysed using the Statistical Package for the Social Sciences (SPSS) version 25.0. Continuous variables were summarized using descriptive statistics, while categorical variables were expressed as frequencies and percentages. Associations between categorical variables were analysed using the Chi-square test. A two-tailed p value of <0.05 was considered statistically significant.

RESULTS
A total of 26 patients with mesenteric ischemia were included in the study. Most patients were aged 51–60 years (42.3%), and there was a male predominance (65.4%).

Abdominal pain was the universal presenting symptom, while vomiting and abdominal distension were each observed in 50.0% of patients, followed by nausea in 46.2%. Smoking was the predominant modifiable risk factor (34.6%), while hypertension and diabetes mellitus were the most frequent comorbidities (15.4% each).

CRP values were available for all 26 patients. All patients demonstrated elevated CRP levels (>10 mg/L), with no cases showing values within the normal range. D-dimer values were also available for all 26 patients, and all demonstrated elevated levels (>0.5 µg/mL). Serum lactate was elevated (>2 mmol/L) in 22 patients (84.6%), while 4 patients (15.4%) had normal levels.

Contrast-enhanced CT was performed in all patients and demonstrated superior mesenteric artery thrombosis or occlusion in 16 (61.5%), bowel wall thickening suggestive of ischemia in 10 (38.5%), bowel obstruction in 10 (38.5%), bowel perforation in 6 (23.1%), mesenteric or portal venous thrombosis in 3 (11.5%), and pneumatosis intestinalis in 3 (11.5%). CT angiography was performed in two patients, demonstrating one arterial and one venous thrombosis.

Of the 26 patients, 21 (80.8%) underwent exploratory laparotomy, 12 (46.2%) received anticoagulation therapy, 3 (11.5%) underwent endovascular intervention, and 2 (7.7%) were managed conservatively. As multiple treatment modalities were employed according to clinical presentation and disease severity, 7 patients (26.9%) underwent exploratory laparotomy with concomitant anticoagulation, 3 (11.5%) received endovascular intervention with anticoagulation, and 2 (7.7%) received conservative management with anticoagulation.

Among the 21 patients who underwent surgery, intraoperative findings included bowel ischemia in 18 (69.2%), gangrenous bowel in 14 (53.8%), and bowel perforation in 10 (38.5%), with several patients demonstrating more than one finding simultaneously. Bowel resection was performed whenever non-viable bowel was encountered. The mean length of resected bowel was 198.8 ± 151.7 cm among patients who died compared with 105.8 ± 102.0 cm among survivors; however, this difference was not statistically significant ($p = 0.103$).

Postoperative sepsis was the most frequent complication, occurring in 46.2% of patients, followed by acute kidney injury in 30.8%. Overall, 17 patients (65.4%) survived to hospital discharge, while 9 patients (34.6%) died during hospitalization. All deaths were attributed to septic complications, including septic shock with multiorgan dysfunction syndrome. The mean hospital stay was 10.1 ± 7.6 days and the mean ICU stay was 6.0 ± 5.3 days. The proportion of total hospital stay spent in the ICU was significantly greater among patients who died than among survivors ($100.0 \pm 0.0\%$ vs $46.7 \pm 9.8\%$; $p < 0.001$).

DISCUSSION
Acute mesenteric ischemia remains one of the most challenging surgical emergencies because of its nonspecific presentation, rapid progression, and high mortality. The present prospective study evaluated the clinical profile, diagnostic findings, management strategies, and outcomes of patients with mesenteric ischemia at a tertiary care centre. Our findings indicate that the disease predominantly affected middle-aged and elderly individuals with vascular risk factors. Contrast-enhanced CT enabled diagnosis in all patients, while CRP and D-dimer were consistently elevated. Despite appropriate treatment, mortality remained high, reflecting delayed presentation and advanced disease.

Demographic Profile and Clinical Presentation
Most patients were aged 51–60 years, with a male predominance, consistent with contemporary epidemiological studies including the AMESI study, Kase et al., and earlier clinical reports [1,2,15]. Increasing age, atherosclerosis, and cardiovascular comorbidities predispose patients to mesenteric vascular occlusion, while the predominance of males may reflect the higher prevalence of smoking and vascular risk factors.

Abdominal pain was the universal presenting symptom, followed by vomiting, abdominal distension, and nausea, findings comparable with the AMESI and DIAGOMI studies [1,3]. Patients with delayed presentation frequently developed peritoneal signs and sepsis, highlighting the difficulty of early diagnosis. As emphasized by the WSES guidelines, physical examination alone is often insufficient, and early CT angiography should be considered in patients with suspected mesenteric ischemia despite subtle clinical findings [12].

Comorbidities and Biomarkers
Smoking was the predominant modifiable risk factor, while hypertension and diabetes were the commonest comorbidities, consistent with previous epidemiological studies identifying cardiovascular disease as an important predisposing factor for acute mesenteric ischemia [1,2,4].

CRP and D-dimer were elevated in all patients and were associated with adverse outcomes, whereas serum lactate showed no significant association with mortality. Although lactate is a marker of intestinal hypoperfusion, it often rises only after advanced intestinal injury and therefore cannot reliably exclude early disease [10,11,21]. Similar observations regarding the limitations of routine laboratory markers have been reported in multicentre studies [3,9]. These findings support current WSES recommendations that biomarkers should complement, rather than replace, prompt radiological evaluation [12].

Radiological Findings
Contrast-enhanced CT played a central role in the diagnosis and assessment of mesenteric ischemia in the present study. It enabled identification of vascular occlusion and associated bowel abnormalities, thereby facilitating treatment planning. CT is currently regarded as the imaging modality of choice in suspected AMI because of its ability to evaluate both the mesenteric vasculature and bowel [6-8,12].

The high prevalence of vascular and bowel abnormalities observed in our cohort reflects the advanced disease encountered at presentation. Findings such as bowel wall thickening, pneumatosis intestinalis, vascular thrombosis, and perforation may indicate progressive intestinal ischemia and help determine the need for operative intervention [7,8]. The findings reinforce the importance of maintaining a low threshold for prompt CT evaluation in patients with suspected mesenteric ischemia.

Management and Clinical Outcomes

Management of AMI depends on the extent of bowel ischemia, physiological status, and underlying aetiology. In the present study, exploratory laparotomy was the principal treatment, reflecting the high proportion of patients presenting with bowel ischemia, gangrene, or perforation. Current guidelines recommend prompt surgical intervention when bowel infarction or peritonitis is present, while revascularization and anticoagulation are employed according to the underlying vascular pathology [12,13].

Endovascular approaches have increasingly become an important component of AMI management, particularly in selected patients with arterial occlusion without established bowel necrosis [18,20]. Multidisciplinary treatment pathways and structured care bundles have also been associated with improved outcomes [18,19].

Despite these advances, mortality in our cohort was 34.6%. Contemporary studies continue to demonstrate substantial mortality in AMI, particularly among patients with advanced intestinal injury [1,3,14,16,17]. The predominance of bowel ischemia, gangrene, and perforation among patients undergoing laparotomy suggests that irreversible intestinal injury had already developed in many patients at the time of diagnosis.

The findings emphasize that outcome is influenced predominantly by the timing of diagnosis and intervention. Early imaging, prompt resuscitation, restoration of mesenteric perfusion when appropriate, and timely management of non-viable bowel remain central to improving survival [12,18,19].

STRENGTHS AND LIMITATIONS

The strengths of this study include its prospective design, consecutive patient enrolment, standardized collection of clinical, laboratory, radiological, operative, and outcome data, and assessment of commonly available biomarkers alongside imaging and treatment findings.

The study had several limitations. It was conducted at a single tertiary care centre and included only 26 patients, limiting generalizability and statistical power for subgroup analyses. The absence of long-term follow-up prevented assessment of late morbidity and survival. Furthermore, the observational design did not permit causal inference regarding associations between individual biomarkers or clinical variables and outcomes.

Clinical Implications

The findings emphasize the importance of maintaining a high index of suspicion for mesenteric ischemia in patienzzzzzts presenting with acute abdominal pain, particularly in the presence of vascular risk factors. Prompt CT evaluation, early multidisciplinary assessment, appropriate revascularization, and timely management of non-viable bowel remain central to improving outcomes [12,18,19]. CRP, D-dimer, and serum lactate may provide supportive clinical information but should not delay definitive radiological evaluation or treatment.

CONCLUSION

Acute mesenteric ischemia remains a life-threatening surgical emergency associated with substantial morbidity and mortality. In this prospective observational study, the disease predominantly affected middle-aged and elderly patients with vascular risk factors. CRP and D-dimer were elevated in all patients, whereas serum lactate showed no significant association with mortality. Contrast-enhanced CT was central to diagnosis and treatment planning.

The findings emphasize the importance of early clinical suspicion, prompt CT evaluation, timely restoration of mesenteric perfusion, and appropriate surgical or endovascular intervention. Biomarkers may provide supportive information but should complement rather than replace clinical and radiological assessment. Larger multicentre prospective studies are required to further evaluate biomarkers and optimize diagnostic and management strategies.

REFERENCES

1. Reintam Blaser, A., Mändul, M., Björck, M., Acosta, S., Bala, M., Bodnar, Z., et al. (2024). Incidence, diagnosis, management and outcome of acute mesenteric ischaemia: A prospective, multicentre observational study (AMESI Study). Critical Care, 28, 32. https://doi.org/10.1186/s13054-024-04807-4
2. Kase, K., Reintam Blaser, A., Tamme, K., Mändul, M., Forbes, A., Talving, P., et al. (2023). Epidemiology of acute mesenteric ischemia: A population-based investigation. World Journal of Surgery, 47(1), 173–181. https://doi.org/10.1007/s00268-022-06805-5
3. Bourcier, S., Ulmann, G., Jamme, M., Savary, G., Paul, M., Benghanem, S., et al. (2022). A multicentric prospective observational study of diagnosis and prognosis features in ICU mesenteric ischemia: The DIAGOMI study. Annals of Intensive Care, 12, 113. https://doi.org/10.1186/s13613-022-01092-8
4. Luther, B., Mamopoulos, A., Lehmann, C., & Klar, E. (2018). The ongoing challenge of acute mesenteric ischemia. Visceral Medicine, 34(3), 217–223. https://doi.org/10.1159/000490318
5. Cudnik, M. T., Darbha, S., Jones, J., Macedo, J., Stockton, S. W., & Hiestand, B. C. (2013). The diagnosis of acute mesenteric ischemia: A systematic review and meta-analysis. Academic Emergency Medicine, 20(11), 1087–1100. https://doi.org/10. 1111/acem.12254
6. Menke, J. (2010). Diagnostic accuracy of multidetector CT in acute mesenteric ischemia: Systematic review and meta-analysis. Radiology, 256(1), 93–101. https://doi.org/10.1148/radiol.10091938
7. Copin, P., Zins, M., Nuzzo, A., Purcell, Y., Beranger-Gibert, S., Maggiori, L., et al. (2018). Acute mesenteric ischemia: A critical role for the radiologist. Diagnostic and Interventional Imaging, 99(3), 123–134. https://doi.org/10.1016/j.diii.2018.01.004
8. Barmase, M., Kang, M., Wig, J., Kochhar, R., Gupta, R., & Khandelwal, N. (2011). Role of multidetector CT angiography in the evaluation of suspected mesenteric ischemia. European Journal of Radiology, 80(3), e582–e587. https://doi.org/10.1016/j.ejrad.2011.09.015
9. Soltanzadeh-Naderi, Y., Reintam Blaser, A., Björck, M., Nuzzo, A., Starkopf, J., Forbes, A., et al. (2024). Diagnostic performance of clinical and routine laboratory data in acute mesenteric arterial occlusion—An international multicenter study. Diagnostics, 14(23), 2705. https://doi.org/10.3390/diagnostics14232705
10. Evennett, N. J., Petrov, M. S., Mittal, A., & Windsor, J. A. (2009). Systematic review and pooled estimates for the diagnostic accuracy of serological markers for intestinal ischemia. World Journal of Surgery, 33(7), 1374–1383. https://doi.org/10.1007/s00268-009-0074-7
11. Acosta, S., & Nilsson, T. K. (2012). Current status on plasma biomarkers for acute mesenteric ischemia. Journal of Thrombosis and Thrombolysis, 33(4), 355–361. https://doi.org/10.1007/s11239-011-0660-z
12. Bala, M., Catena, F., Kashuk, J., De Simone, B., Gomes, C. A., Weber, D. G., et al. (2022). Acute mesenteric ischemia: Updated guidelines of the World Society of Emergency Surgery. World Journal of Emergency Surgery, 17, 54. https://doi.org/10.1186/s13017-022-00443-x
13. Björck, M., Koelemay, M., Acosta, S., Bastos Gonçalves, F., Kölbel, T., Kolkman, J. J., et al. (2017). Management of the diseases of mesenteric arteries and veins: Clinical practice guidelines of the European Society of Vascular Surgery (ESVS). European Journal of Vascular and Endovascular Surgery, 53(4), 460–510.
14. Tamme, K., Reintam Blaser, A., Laisaar, K. T., Mändul, M., Kals, J., Forbes, A., et al. (2022). Incidence and outcomes of acute mesenteric ischaemia: A systematic review and meta-analysis. BMJ Open, 12, e062846. https://doi.org/10.1136/bmjopen-2022-062846
15. Oldenburg, W. A., Lau, L. L., Rodenberg, T. J., Edmonds, H. J., & Burger, C. D. (2004). Acute mesenteric ischemia: A clinical review. Archives of Internal Medicine, 164(10), 1054–1062. https://doi.org/10.1001/archinte.164.10.1054
16. Schoots, I. G., Koffeman, G. I., Legemate, D. A., Levi, M., & van Gulik, T. M. (2004). Systematic review of survival after acute mesenteric ischaemia according to disease aetiology. British Journal of Surgery, 91(1), 17–27. https://doi.org/10.1002/bjs.4459
17. Adaba, F., Askari, A., Dastur, J., Patel, A., Gabe, S. M., & Vaizey, C. J., et al. (2015). Mortality after acute primary mesenteric infarction: A systematic review and meta-analysis of observational studies. Colorectal Disease, 17(7), 566–577. https://doi.org/10.1111/codi.12938
18. Corcos, O., Castier, Y., Sibert, A., Gaujoux, S., Ronot, M., Joly, F., et al. (2013). Effects of a multimodal management strategy for acute mesenteric ischemia on survival and intestinal failure. Clinical Gastroenterology and Hepatology, 11(2), 158–165.e2. https://doi.org/10.1016/j.cgh.2012.10.027
19. Tolonen, M., Lemma, A., Vikatmaa, P., Peltola, E., Mentula, P., Björkman, P., et al. (2021). The implementation of a pathway and care bundle for the management of acute occlusive arterial mesenteric ischemia reduced mortality. Journal of Trauma and Acute Care Surgery, 91(3), 480–488. https://doi.org/10.1097/TA.0000000000003305
20. Arthurs, Z. M., Titus, J., Bannazadeh, M., Eagleton, M. J., Srivastava, S., & Hagspiel, K. D., et al. (2011). A comparison of endovascular revascularization with traditional therapy for the treatment of acute mesenteric ischemia. Journal of Vascular Surgery, 53(3), 698–704.
21. Nuzzo, A., Joly, F., Ronot, M., Castier, Y., Huguet, A., Paugam-Burtz, C., et al. (2020). Normal lactate and unenhanced CT scan result in delayed diagnosis of acute mesenteric ischemia. The American Journal of Gastroenterology, 115(11), 1902–1905. https://doi.org/10.14309/ajg.0000000000000836