



ACUTE MESENTERIC ISCHEMIA WITH BOWEL GANGRENE: CASE SERIES IN A TERTIARY CARE CENTRE

General Surgery

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ABSTRACT

Introduction: Acute Mesenteric ischemia (AMI) is a worrisome clinical condition leading to end stage irreversible bowel necrosis. In spite of advances in medical field, it continues to remain a diagnostic challenge for surgeons leading to delay in diagnosis and high mortality. In this series we present 8 cases of AMI with bowel gangrene treated surgically with an aim to describe its presentation and various management strategies at our institution. **Methodology:** This prospective series of patients operated for acute mesenteric ischemia with bowel gangrene was conducted in a tertiary care hospital in Eastern India from January 2021 to August 2022. All patients presenting to the emergency department with abdominal pain, features of obstruction with or without peritonitis operated with a pre operative diagnosis of acute mesenteric ischemia confirmed radiologically were taken for the study. **Results:** This series comprised of 8 patients, of which 5 (62.5%) were male and 3 (37.5%) were female. The mean age of patients was 58.5 ± 8.9 years with a range from 45 to 75 years. The most consistent presenting feature was abdominal pain (100%) followed by vomiting (50%) and distension (50%). Four (50%) of patients had a pre-existing cardiac illness. The mean length of hospital stay was 7.6 ± 3.87 days. Post operative complication occurred in 4 patients. The mortality rate in our series was 37.5%. **Conclusion:** AMI is a life threatening vascular emergency with high mortality and morbidity. Most present in a delayed stage where irreversible bowel ischemia has set in requiring emergency laparotomy. High index of clinical suspicion is required for early diagnosis and prompt effective treatment to prevent disastrous consequences.

KEYWORDS

Acute mesenteric ischemia, Bowel gangrene, Thrombosis, acute abdomen, Intestinal obstruction

INTRODUCTION:

Acute Mesenteric ischemia (AMI) is a devastating clinical entity characterised by either partial or complete disruption of mesenteric blood flow, leading to end stage irreversible bowel necrosis. It may either be occlusive due to thrombosis or emboli in the superior mesenteric artery or its branches, or mesenteric venous thrombosis or non occlusive (NOMI) [1]. Although the overall incidence is low, representing about 0.09 to 0.2% of all acute admissions to the emergency, the mortality associated with it is exponential (50 to 80%) [2,3]. The survival rate has not improved over the past few decades, though there have been significant improvement in healthcare, majorly because of difficulty in early recognition of the condition [4, 5]. Clinical presentation and behaviour of the condition is nonspecific causing the dilemma in diagnosis amongst surgeons.

Owing to the rapid progression of the disease, the complications which ensue may sometimes be the only presentation of the condition in a developing country like India. In this series we present 8 cases of AMI with bowel gangrene treated surgically with an aim to describe its presentation and various management strategies at our institution.

MATERIALS AND METHODS:

This prospective series of patients operated for acute mesenteric ischemia with bowel gangrene was conducted in a tertiary care hospital in Eastern India from January 2021 to July 2022. All patients presenting to the emergency department with abdominal pain, features of obstruction with or without peritonitis operated with a pre operative diagnosis of acute mesenteric ischemia confirmed radiologically were taken for the study. Exclusion criteria included patients who refused consent and age less than 16 years. The study was approved by the institutional ethics committee and informed consent of the patients was taken.

All patients were initially resuscitated at the ER with fluids, electrolyte correction, nasogastric aspiration, urinary catheterisation and broad spectrum antibiotics. Preoperative evaluation included a complete haemogram, renal and liver function tests, plain radiograph of the abdomen, ultrasonography of abdomen and pelvis and contrast enhanced computed tomography (CECT) of the abdomen was performed where warranted. Patients with preoperative diagnosis or high suspicion of AMI warranting surgery, underwent exploratory laparotomy, documenting all the findings. Patients underwent resection of the gangrenous segment of bowel with either an anastomosis of two ends or diversion ostomy as necessitated. Post

operatively patients were monitored as per the institutional protocol with necessary medical support either in the intensive care unit or surgical unit initial recovery or death. The entire patient's data including age, sex, presentation, investigations, intra operative findings, post operative complications (Clavien-Dindo score > 2 [6]), length of hospital stay and mortality were tabulated and analysed.

Case Series

Case 1: SMA thrombosis with pre-existing rheumatic heart disease and atrial fibrillation

A 45 year old gentleman, known to have rheumatic heart disease and atrial fibrillation on warfarin presented with sudden onset of moderate to severe abdominal pain for 5 days with abdominal distension and vomiting. On clinical examination, patient was vitally stable with diffuse tenderness over the abdomen. Per Rectal examination was unremarkable. Blood investigations revealed a deranged coagulation profile with INR of 2.1. Ultrasonography of the abdomen showed gaseous distension of small bowel loops with aperistalsis. Contrast enhanced CT of the abdomen was done in suspicion of AMI which revealed ischemic segment of bowel (gas within the bowel wall) with superior mesenteric artery (SMA) thrombosis. In consultation with the cardiologist, he was switched over from warfarin to enoxaparin. Patient underwent exploratory laparotomy after stabilisation revealing 70 cm gangrenous segment of jejunum 50 cm distal to duodenal-jejunal junction as shown in figure 1. Resection of the affected segment with end to end small bowel anastomosis was performed. Post operatively patient improved with no worrisome complications. He was started on heparin and discharged on day 9 and is doing well on follow up.

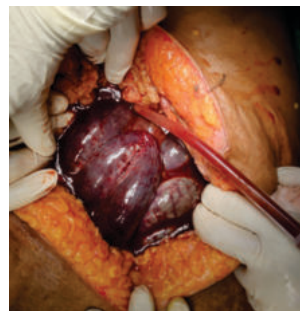


Figure 1: Laparotomy showing gangrenous segment of small bowel

Case 2: SMA thrombosis with bowel gangrene post COVID-19 infection

55 year old lady, a diabetic with history of moderate COVID-19 infection one month back, presented with severe abdominal pain and vomiting for 3 days. Abdominal examination revealed only limited tenderness over the abdomen. All relevant blood investigations were within normal limits. Contrast enhanced CT abdomen showed dilated fluid filled small bowel loops with distal ileal loop showing air densities within its wall as shown in figure 2. With the failure of initial medical management, patient underwent exploratory laparotomy to reveal 150 cm of small bowel gangrene from 40 cm distal to duodenal-jejunal junction to ileo-cecal junction. Large segment resection was done as shown in figure 3, with jejunum-transverse anastomosis. Post operatively patient was managed in the intensive care unit. On post operative day 3 patient developed sepsis with surgical site infection progressing to multi organ dysfunction syndrome before succumbing on post operative day 6.

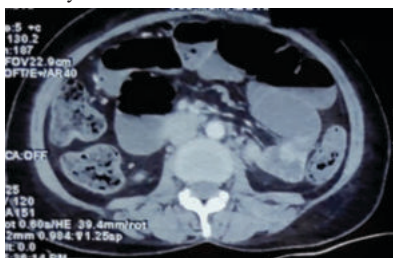


Figure 2: Contrast enhanced CT abdomen showing dilated fluid filled small bowel loops with distal ileal loop showing air densities within its wall



Figure 3: Intraoperative Finding of large segment of Gangrenous Small Bowel.



Figure 4: Large segment gangrenous small bowel resected specimen.

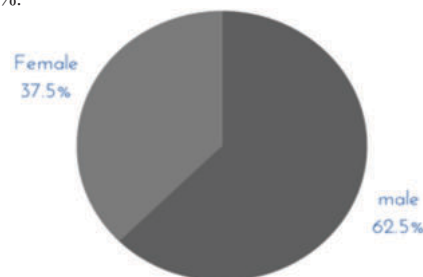
The Summary Of Other Cases In The Series Are Described In Table 1.

Case no	Age / Sex	Presenta-tion	Comorbidities / Risk factor	Relevant investigations	Surgery performed	Post operative course	Outcome
3	62 / Male	Abdominal pain, distension, vomiting	Hypertension, Coronary artery disease (CAD)	CECT abdomen revealed features suggestive of AMI with ischemic segment involving terminal ileum	Laparotomy with resection and ileo-ascending anastomosis	Patient developed superficial surgical site infection	Doing well on follow up

4	75 / Male	Abdominal pain, nausea and vomiting	Hypertensive and diabetic	CECT abdomen with features of AMI and SMA thrombosis	Managed conservatively due to poor condition of the patient and not willing for surgery	-	Succumbed on day 2 of admission
5	58 / Female	Abdominal pain, constipation	Diabetic	CECT abdomen suggestive of AMI with SMA thrombosis	Managed conservatively owing to improvement of symptoms and return of bowel sounds	-	Lost to follow up
6	48 / Male	Abdominal pain, distension	History of transient ischemic attack	Ultrasonography abdomen revealed free fluid with dilated aperistaltic bowel	Laparotomy with resection and anastomosis of gangrenous bowel	Patient developed an acute coronary event on post operative day 2	Succumbed on post operative day 2
7	60 / Male	Abdominal Pain	Diabetic	CECT abdomen with features of AMI	Laparotomy with resection of 50 cm of gangrenous segment and end to end anastomosis	Uneventful	Doing well on follow up
8	65 / Female	Abdominal pain, distension	Coronary artery disease	CECT abdomen suggestive of AMI with SMA thrombosis	Laparotomy with resection and anastomosis	Uneventful	Lost to follow up

RESULTS:

This series comprised of 8 patients, of which 5 (62.5%) were male and 3 (37.5%) were female as depicted in graph 1. The mean age of patients was 58.5 ± 8.9 years with a range from 45 to 75 years. The most consistent presenting feature was abdominal pain (100%) followed by vomiting (50%) and distension (50%). Diabetes and hypertension as comorbidities was present in 50% and 25% of the cases respectively. One patient had a history of COVID 19 infection within the past one month. 4 (50%) of patients had a pre-existing cardiac illness. The mean length of hospital stay was 7.6 ± 3.87 days. Post operative complication occurred in 4 patients. The mortality rate in our series was 37.5%.



Graph 1: Gender distribution of the patient

DISCUSSION:

Acute mesenteric ischemia leading to bowel gangrene is a life threatening emergency if not recognised and managed promptly. It is most commonly associated with a migration of a thrombus causing arterial occlusion due to any pre-existing heart disease [7, 8]. Most emboli lodge along the main trunk of the SMA distal to the origin of middle colic artery, owing to its wide angle of origin and parallel course to aorta [9].

Having non specific symptoms and signs, its clinical recognition is

difficult. Patients with AMI usually present with severe sudden onset abdominal pain out of proportion to physical signs [10]. The spectrum of presentation in our series is comparable with reports by other authors [11], showing abdominal pain to be the most consistent feature followed by vomiting. There is no diagnostic blood tests to arrive at a diagnosis, although elevated lactate and D-dimer may have corroborative value [10]. The investigation of choice for suspected cases of AMI is computed tomography angiography (CTA) having a high specificity [12]. Routine CECT abdomen may demonstrate features of irreversible bowel ischemia such as intestinal wall thickening, pneumatosis intestinalis and portal venous gas [13].

Pre-existing comorbidities such as CAD, atrial fibrillation, deep vein thrombosis increase the risk of the disease [8]. Our series reported that 50% of the patients with AMI had an underlying cardiac illness, making this disease common in the elderly. In the setting of peritonitis, prompt laparotomy must be performed to avoid septic complications [10]. Although diagnostic laparoscopy has its role in cases of doubt [14], that utility of which was minimal in our series. The management of such patients demand resection of the gangrenous segment of the bowel with either an anastomosis to restore continuity or an ostomy as the patient condition dictates. The fear of short bowel syndrome after large segment resection is another surgical challenge requiring further management strategies increasing the financial burden [15]. Apart from developing strategies for early diagnosis, there is a need to stratify such patients based on their clinical condition to effectively institute aggressive treatment measure to improve the outcome.

CONCLUSION:

AMI is a clinical challenge for surgeons with a wide spectrum of aetiologies and presentation. High index of clinical suspicion and risk stratification are necessary to improve the clinical outcome. With recent advances such as endovascular therapies, the role of emergency laparotomy is limited to patients with peritonitis and end stage bowel gangrene. The need for interdisciplinary team with a surgeon is essential to achieve the best results.

Conflict of Interest: None to declare

REFERENCES:

1. Clair DG, Beach JM. Mesenteric Ischemia. *N Engl J Med*. 2016 Mar 10;374(10):959-68. doi: 10.1056/NEJMra1503884. PMID: 26962730.
2. Acosta S, Bjorck M. Acute thrombo-embolic occlusion of the superior mesenteric artery: a prospective study in a well-defined population. *Eur J Vasc Endovasc Surg*. 2003;26:179-83.
3. Schoots IG, Koffeman GI, Legemate DA, Levi M, van Gulik TM. Systematic review of survival after acute mesenteric ischaemia according to disease aetiology. *Br J Surg*. 2004 Jan;91(1):17-27. doi: 10.1002/bjs.4459. PMID: 14716789.
4. Heys SD, Brittenden J, Crofts TJ. Acute mesenteric ischaemia: the continuing difficulty in early diagnosis. *Postgrad Med J*. 1993;69:48-51.
5. Clark ET, Gerwitz BL. Mesenteric ischemia. In: Hall JB, Schmidt GA, Wood LD, eds. *Principles of Critical Care*. New York, NY: McGraw-Hill Co; 1998: 1279-1286.
6. Clavien PA, Barkun J, de Oliveira ML, Vauthey JN, Dindo D, Schulick RD, de Santibañes E, Pekolj J, Slankamenac K, Bassi C, Graf R, Vonlanthen R, Padbury R, Cameron JL, Makuuchi M. The Clavien-Dindo classification of surgical complications: five-year experience. *Ann Surg*. 2009 Aug;250(2):187-96. doi: 10.1097/SLA.0b013e3181b13ca2. PMID: 19638912
7. Basavanagowdappa H, Babu S, Kumar P, Nanaiah MM, Jeevan HR. Superior mesenteric artery embolism. *J Assoc Physicians India*. 2008; 56: 907-9.
8. Oldenburg WA, Lau LL, Rodenberg TJ, Edmonds HJ, Burger CD. Acute Mesenteric Ischemia: A Clinical Review. *Arch Intern Med*. 2004;164(10):1054-1062. doi:10.1001/archinte.164.10.1054
9. Menke J, Luthje L, Kastrup A, Larsen J. Thromboembolism in atrial fibrillation. *Am J Cardiol*. 2010; 105(4): 502-10
10. Bala, M., Kashuk, J., Moore, E.E. et al. Acute mesenteric ischemia: guidelines of the World Society of Emergency Surgery. *World J Emerg Surg* 12, 38 (2017). <https://doi.org/10.1186/s13017-017-0150-5>
11. Park WM, Gloviczki P, Cherry KJ Jr, Hallett JW Jr, Bower TC, Panneton JM, Schleck C, Ilstrup D, Harmsen WS, Noel AA. Contemporary management of acute mesenteric ischemia: Factors associated with survival. *J Vasc Surg*. 2002;35:445-52
12. Aschoff AJ, Stuber G, Becker BW, Hoffmann MH, Schmitz BL, Schelzig H, et al. Evaluation of acute mesenteric ischemia: accuracy of biphasic mesenteric multi-detector CT angiography. *Abdom Imaging*. 2009;34:345-57.
13. Kirkpatrick ID, Kroeker MA, Greenberg HM. Biphasic CT with mesenteric CT angiography in the evaluation of acute mesenteric ischemia: initial experience. *Radiology*. 2003;229:91-8
14. S. Krishnabharath, S. Mathan Sankar. Acute superior mesenteric vessel thrombosis with bowel ischemia – Case series. *IAIM*. 2016; 3(8): 258-265
15. Gupta PK, Natarajan B, Gupta H, Fang X, Fitzgibbons RJ Jr. Morbidity and mortality after bowel resection for acute mesenteric ischemia. *Surgery*. 2011 Oct;150(4):779-87. doi: 10.1016/j.surg.2011.07.079. PMID: 22000191.