

Acute Intestinal Ischemia Due to Thrombosis of the Superior Mesenteric Artery: A Case Report and Review of Literature

Gde Rastu Adi Mahartha^{1*}, Anak Agung Anom Arie Wiradana²,
and I Dewa Gde Aditya Diprabawa³

¹General Surgery Resident, Faculty of Medicine,
Udayana University/Prof. Dr. IGNG Ngoerah General Hospital

²General Surgeon, Division of Vascular and Endovascular Surgeon,
Faculty of Medicine, Udayana University/ Udayana University General Hospital

³Cardiologist, Faculty of Medicine, Udayana University/
Udayana University General Hospital

E-mail: rastumahartha@gmail.com; anomwiradana@gmail.com;
adityadiprabawa@unud.ac.id

Corresponding author details: Gde Rastu Adi Mahartha; rastumahartha@gmail.com

ABSTRACT

Introduction: Acute mesenteric ischemia (AMI) is a rare medical condition with a prevalence of 0.1%. Difficult diagnosis and rapid disease progression can challenge clinicians in dealing with these cases. **Case Report:** An 87-year-old woman came to the emergency room with abdomen pain. Patient with a history of uncontrolled AF. Vital signs on arrival BP 100/70 mmHg, HR 100x/m, RR 20x/m, temp. 36.7 °C. Laboratory hemoglobin 12, leukocytes 42.6, neutrophils 89%, lymphocytes 10%, blood glucose 224 mg/dL. Physical examination showed tenderness throughout the abdomen with muscular defense and decreased peristalsis. Abdominal radiography showed free air appearing outside the intestinal contour with a continuous sub diaphragm sign and lateral decubitus sign. The patient decided to undergo an emergency exploratory laparotomy and intestinal ischemia (ileum) was found along 20 cm and thrombus along the mesentery artery. A 30 cm resection of the Treitz ligament was carried out followed by an end-to-end ileo-ileal anastomosis. **Discussion:** Clinical manifestations and supporting examination results of AMI are often unclear and difficult to distinguish from other acute abdominal symptoms. AMI management consists of initial management and surgical management. Initial management includes fluid resuscitation, electrolyte correction, and nasogastric decompression. After initial therapy, the patient in our case underwent emergency exploratory laparotomy with broad-spectrum antibiotic premedication.

Keywords: acute mesenteric ischemia; thrombosis of the superior mesenteric artery

INTRODUCTION

Mesenteric ischemia is a condition of gastrointestinal hypoxia caused by a sudden decrease in mesenteric vascular flow.¹ Based on the course of the disease, mesenteric ischemia can be divided into acute and chronic cases, with a high mortality rate of acute cases (60-80%).² Despite its high mortality rate, acute mesenteric ischemia (AMI) is a rare medical condition with a prevalence of 0.1%.^{1,2} The cause of AMI can be either occlusive (thromboembolism or acute thrombosis) or non-occlusive (iatrogenic).¹

AMI generally has manifestations of abdominal pain that do not match the results of physical examination.¹ In addition, AMI requires prompt and appropriate management to prevent tissue necrosis that can potentially lead to death.¹

Difficult diagnosis and rapid disease progression can challenge clinicians in dealing with these cases.¹ In this case study, the authors present a case of AMI in an elderly woman caused by thrombosis of the superior mesenteric artery (SMA).

CASE REPORT

An 87-year-old woman came to the emergency room with complaints of pain throughout the abdomen, flatulence, and unable to defecate since 5 days ago. Complaints were also accompanied by vomiting and diarrhea without mucus or blood, without complaints of fever. The patient with a history of uncontrolled AF, history of diabetes, and hypertension was denied. Vital signs on arrival BP 100/70 mmHg, HR 100x/m, RR 20x/m, temp 36.7 °C.

Laboratory hemoglobin 12, leukocytes 42.6, neutrophils 89%, lymphocytes 10%, blood glucose 224 mg/dL, renal function, hepatic function, PT APTT INR within normal limits. Physical examination showed tenderness throughout the abdomen with muscular defense and decreased peristalsis.

Abdominal radiography showed free air appears outside the intestinal contour with a continuous sub-diaphragm sign, and lateral decubitus sign (Figure 1).



FIGURE 1: Abdominal radiography.

The patient was decided to undergo an emergency exploratory laparotomy. During the operation, intestinal ischemia (ileum) was found along 20 cm (Figure 2) and thrombus along the mesentery artery. A 30 cm resection of the Treitz ligament was carried out followed by an end-to-end ileo-ileal anastomosis.

After surgery, the patient was treated in the ICU ward. Echocardiography study finding: RA, RV dilatation, D-shaped LV, McConnell's Sign (+), normal LV systolic function EF 56%, decreased RV systolic function (TAPSE 0.85 cm), valve: moderate TR, mild PR, mild AR eRAP 15, low cardiac output (1.68 L/min). During observation, the patient died of pulmonary embolism.

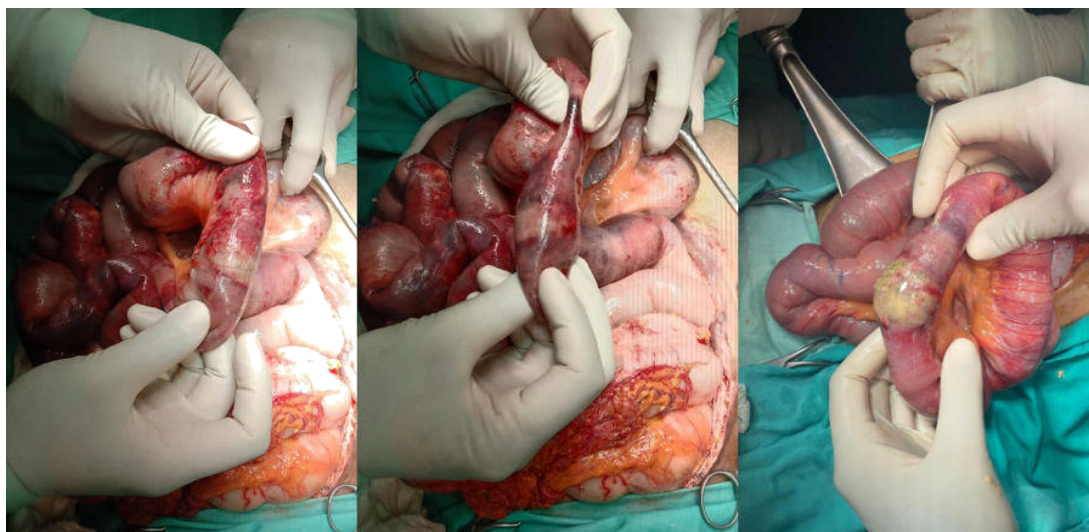


FIGURE 2: Intestinal ischemia (ileum) along the length of 20 cm.



FIGURE 3: Thrombus along the mesenteric artery.



FIGURE 4: A 30 cm intestinal resection (ileum).

DISCUSSION

The gastrointestinal tract has three main blood vessels: the SMA, the inferior mesenteric artery (AMI), and the celiac artery.² The SMA drains the lower two-thirds of the duodenum to the transverse colon, while the AMI drains the distal one-third of the transverse colon to the rectum.² A 75% reduction in gastrointestinal blood flow for more than 12 hours has the potential to cause intestinal ischemia.³

Intestinal ischemia can be classified into mesenteric ischemia and colonic ischemia, with mesenteric ischemia being more common (60-70%).³ Mesenteric ischemia can be further divided into acute and chronic, with AMI being a surgical emergency with severe symptoms.³ The incidence of AMI is low, accounting for only 0.09-0.2% of all acute surgical admissions.⁴ In contrast to the low incidence, the mortality rate of mesenteric ischemia is high ranging from 24-94%, with a configured AMI mortality rate of 60-80%.^{2,4}

AMI is most commonly caused by mesenteric artery embolism (50%), followed by hypoperfusion or non-occlusive mesenteric ischemia (20-30%), mesenteric artery thrombosis (15-25%), and mesenteric vein thrombosis (5%).²

AMI is commonly found in elderly women with severe comorbidities, including cardiovascular disease.⁴ Although rare, a case of AMI in a young woman was reported by Ibarra, et al in Mexico.⁴ In this case, the patient was an elderly woman with a history of uncontrolled AF. Atrial tachyarrhythmias, congestive heart failure, myocardial infarction, cardiomyopathy, and ventricular aneurysms can lead to thrombus formation, further resulting in embolism of the superior mesenteric artery.¹ Prolonged ischemia can cause necrosis of the gastrointestinal wall and lead to perforation.²

Clinical manifestations and supporting examination results of AMI are often unclear and difficult to distinguish from other acute abdominal symptoms.^{2,5} Symptoms that can appear include sudden abdominal pain with severe pain characteristics (with mild palpation pain throughout the abdominal field without guarding or rebound tenderness), accompanied by post-prandial pain, nausea and vomiting, diarrhea or constipation, distension, and hematochezia/melena.^{1,2} Hematological examination initially shows normal results, with the continued progress of ischemia, leukocytosis (shift to the left), increased amylase, and lactate dehydrogenase (LDH) can be found.^{1,2} Radiologic examination using computed tomography (CT) angiography is an option because it has high sensitivity (96-100%) and specificity (89-94%). Abdominal x-ray, duplex ultrasonography, and magnetic resonance angiography (MRA) can be alternatives to support the diagnosis of AMI.¹

The patient in our case complained of abdominal pain, distension, and constipation. Physical examination showed stable hemodynamics, with physical examination results similar to the case reported by Ibarra, et al. namely abdominal palpation pain throughout the visual field accompanied by muscular defense and decreased peristalsis. An elevated leukocyte count with high neutrophils in this patient was also found in AMI patients reported in the literature and other case studies.⁶ We used the same 2-position plain abdominal photograph examination as Ibarra, et al. with findings of multiple air-fluid levels. The finding of peritoneal irritation sign is highly undesirable, as it indicates irreversible ischemia. Examination using plain abdominal photographs is not sensitive and specific for assessing AMI and is often found to be normal if no tissue infarction has occurred.⁷

AMI management consists of initial management and surgical management. Initial management includes fluid resuscitation, electrolyte correction, and nasogastric decompression.^{1,4} Vasopressor drugs such as alpha-adrenergic are contraindicated as they can cause vasospasm.^{1,4} Premedication with broad-spectrum antibiotics is necessary to prevent sepsis, as in AMI there can be mucosal barrier damage that facilitates bacterial translocation. Based on the type of occlusion and its location, endovascular or open surgery can be chosen to treat occlusive AMI.^{1,4} Endovascular surgical options include mechanical thrombectomy, catheter-directed thrombolysis, and balloon angioplasty; while open surgery can include exploratory laparotomy with damage control, or revascularization by embolectomy or mesenteric bypass.^{1,4}

After initial therapy, the patient in our case underwent emergency exploratory laparotomy with broad-spectrum antibiotic premedication. According to the 2017 World Society of Emergency Surgery guideline, AMI patients with physical examination results suggestive of gastrointestinal infarction need

immediate exploratory laparotomy surgery (recommendation 1A) with the aim of (1) revascularizing the gastrointestinal tract, (2) resecting non-viable tissue, and (3) preserving viable gastrointestinal tissue.⁸ After performing the midline incision, the operator assesses the condition of the gastrointestinal tract to determine the extent of necrotic tissue resection. After resection of necrotic tissue, the patient underwent end-to-end ileo-ileal anastomosis.⁹ Establishment of primary anastomosis remains controversial as some studies have reported a risk of anastomotic leakage.^{9,10} A retrospective cohort study by Verena, et al. suggested that patients with viable gastrointestinal tissue and stable hemodynamics were eligible for primary anastomosis (with a leakage rate of 10% of total anastomosis).¹¹

AMI patients have a poor prognosis with high morbidity (56%) and mortality.¹ The most common postoperative complications are shock sepsis and pneumonia. Additional surgical intervention is often required in 30% of patients.¹¹ Verena, et al. showed that the mortality rate of patients who received curative surgery was high (41%). The majority of patients with AMI have multiple comorbidities, so quality of life and prognosis are often poor. In this case, the patient died during observation in the ICU with PE as the cause of death.

In conclusion, patients with AMI despite having a low prevalence, have a high mortality. Prompt diagnosis and appropriate management are required to prevent tissue necrosis and unwanted complications. The process of confirming the diagnosis of AMI is not easy because the clinical manifestations and supporting examinations are difficult to distinguish from other differential diagnoses. Abdominal pain that does not match the results of the physical examination can be used as a reference for the clinician to suspect AMI as the cause. Initial management with fluid resuscitation and endovascular or open surgery can be performed according to the patient's condition.

REFERENCES

- [1] Monita MM, Gonzalez L. Acute Mesenteric Ischemia. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 [cited 2024 Feb 17]. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK431068/>
- [2] Amini A, Nagalli S. Bowel Ischemia. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 [cited 2024 Feb 17]. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK554527/>
- [3] Patel R, Waheed A, Costanza M. Chronic Mesenteric Ischemia. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 [cited 2024 Feb 17]. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK430748/>

- [4] Bala M, Catena F, Kashuk J, De Simone B, Gomes CA, Weber D, et al. Acute mesenteric ischemia: updated guidelines of the World Society of Emergency Surgery. *World J Emerg Surg WJES*. 2022 Oct 19;17(1):54.
- [5] Niang FG, Faye I, Ndong A, Diedhiou M, Niang I, Diop AD, et al. Acute mesenteric ischemia: A case report. *Radiol Case Rep*. 2023 Oct 28;19(1):150–2.
- [6] Ibarra SA, Solano PG, Arredondo GP. Acute Intestinal Ischemia Due to Thrombosis of the Superior Mesenteric Artery in a Female Young Patient: A Clinical Case. *Mathews J Case Rep*. 2019 Jul 1;4(2):1–4.
- [7] Olson MC, Fletcher JG, Nagpal P, Froemming AT, Khandelwal A. Mesenteric ischemia: what the radiologist needs to know. *Cardiovasc Diagn Ther*. 2019 Aug;9(Suppl 1):S74–87.
- [8] Bala M, Kashuk J, Moore EE, Kluger Y, Biffl W, Gomes CA, et al. Acute mesenteric ischemia: guidelines of the World Society of Emergency Surgery. *World J Emerg Surg*. 2017 Aug 7;12(1):38.
- [9] Witte M, Neese M, Leuchter M, Philipp M, Klar E, Schafmayer C. Acute Mesenteric Ischemia: Preexisting Comorbidity Determines Short-Term Outcome and Quality of Life in Long-Term Survivors. *Visc Med*. 2022 Dec;38(6):393–9.
- [10] Acosta S, Salim S. Management of Acute Mesenteric Venous Thrombosis: A Systematic Review of Contemporary Studies. *Scand J Surg SJS Off Organ Finn Surg Soc Scand Surg Soc*. 2021 Jun;110(2):123–9.
- [11] Martini V, Lederer AK, Fink J, Chikhladze S, Utzolino S, Fichtner-Feigl S, et al. Clinical characteristics and outcome of patients with acute mesenteric ischemia: a retrospective cohort analysis. *Langenbecks Arch Surg*. 2022 May;407(3):1225–32.