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Case Report

# Superior mesenteric artery embolectomy and second-look laparoscopy technique in acute mesenteric ischemia: A case report

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**Abstract**

Although acute mesenteric ischemia is not common, its incidence increases with aging and comorbidities. Early diagnosis and early intervention reduce mortality. Endovascular and open revascularization methods are used in the treatment of acute mesenteric ischemia. Intestinal viability should be evaluated, due to the possibility of ischemia-reperfusion injury in patients undergoing embolectomy. Therefore, planned relaparotomy is an important part of ischemia management. In this case, we aimed to describe the superior mesenteric artery embolectomy, the importance of second-look laparoscopy, and our subsequent treatment approach to the patient diagnosed with acute mesenteric ischemia.

**Keywords:** Acute mesenteric ischemia; ischemia-reperfusion injury; embolectomy; second-look laparoscopy

## INTRODUCTION

Although acute mesenteric ischemia is not common, its incidence increases with aging and comorbidities such as diabetes mellitus, hypertension, atrial fibrillation, prosthetic heart valve, previous myocardial infarction, arteriosclerosis. It is a serious life-threatening disease with a mortality rate of 60-80% (1-3). Early diagnosis and early intervention prevent the process of developing intestinal necrosis (4). Although there is no definite criterion for treatment, endovascular and open revascularization methods are used. There was no statistically significant difference in mortality rates for both procedures (5,6). Planned relaparotomy is an important part of ischemia management in cases where intestinal resection is required or intestinal viability needs to be evaluated (7). In this case, we planned to describe the superior mesenteric artery embolectomy, small bowel resection performed after second-look laparoscopy and our subsequent treatment approach to the patient diagnosed with acute mesenteric ischemia.

## CASE REPORT

A 63-year-old male patient with known coronary artery disease was referred to our hospital with the diagnosis of acute mesenteric ischemia on abdominal CT angiography (Figure 1a, 1b, 1c, 1d). There was no feature in the patient's disease history. In the physical examination of the patient, the pulse was: 130 / min and there was no pathology except pain in the epigastrium and right quadrant by palpation. In CT angiography, where the superior mesenteric artery (SMA) gave the ileocecal branch, embolism and associated wall thickening were detected in the bowel loops. Diagnostic laparoscopy was performed on the patient who was taken to the emergency operation. Ischemia was observed in all small intestines and it was decided to perform a laparotomy. No pulse was detected manually in SMA branches. By opening the mesos of the transverse colon, SMA was revealed in the superior mesenteric vein medial. Following the systemically applied heparinization, after the control of proximal and distal of the superior mesenteric artery bed, an arteriotomy was performed vertically along the long axis of the artery. The embolectomy procedure was performed by sending a Fogarty® embolectomy catheter to the proximal, distal and jejunal bed by removing the thrombus material in the arteriotomy region after the milking maneuver. The procedure was repeated until significant reflux was obtained for both the proximal

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and distal arterial beds. Both distal and proximal arterial beds were washed with a heparinized saline solution. The arteriotomy was repaired with continuous prolene suturing and clamped. After opening the clamp, there was a prominent pulse at the distal of the arteriotomy region, there was no thrill. Improvement was seen in the circulation of ischemic intestinal segments. A 10-mm trocar was inserted into the left lower quadrant of the abdomen for a second look laparoscopy before closing the abdomen in the first operation (Figure 3). In the laparoscopy performed the following day, it was observed that there was ischemia in 3 areas in the small intestine between 160 and 220 cm from the ligament of Treitz. A laparotomy was performed for small bowel resection. An approximately 60 cm long segment was resected and an end-to-end anastomosis was performed. In this process, extended antibiotherapy was initiated to prevent bacterial translocation. Hypovolemia was avoided in the general follow-up and treatment of the patient. Warfarin was started in the patient who did not develop any complications in the postoperative period and the INR value was kept in the range of 2.5-3. The hospitalization period of the patient was 23 days. The patient was supplemented with glutamine-based oral foods and N-acetylcysteine before discharge. After discharge, the patient was called to the controls at the 1st, 3rd and 6th months. Hemogram, biochemistry and coagulation parameters were checked. On control abdominal tomography, SMA and its branches were found to be open (Figure 2a, 2b, 2c). No complications developed during his long and close follow-up.

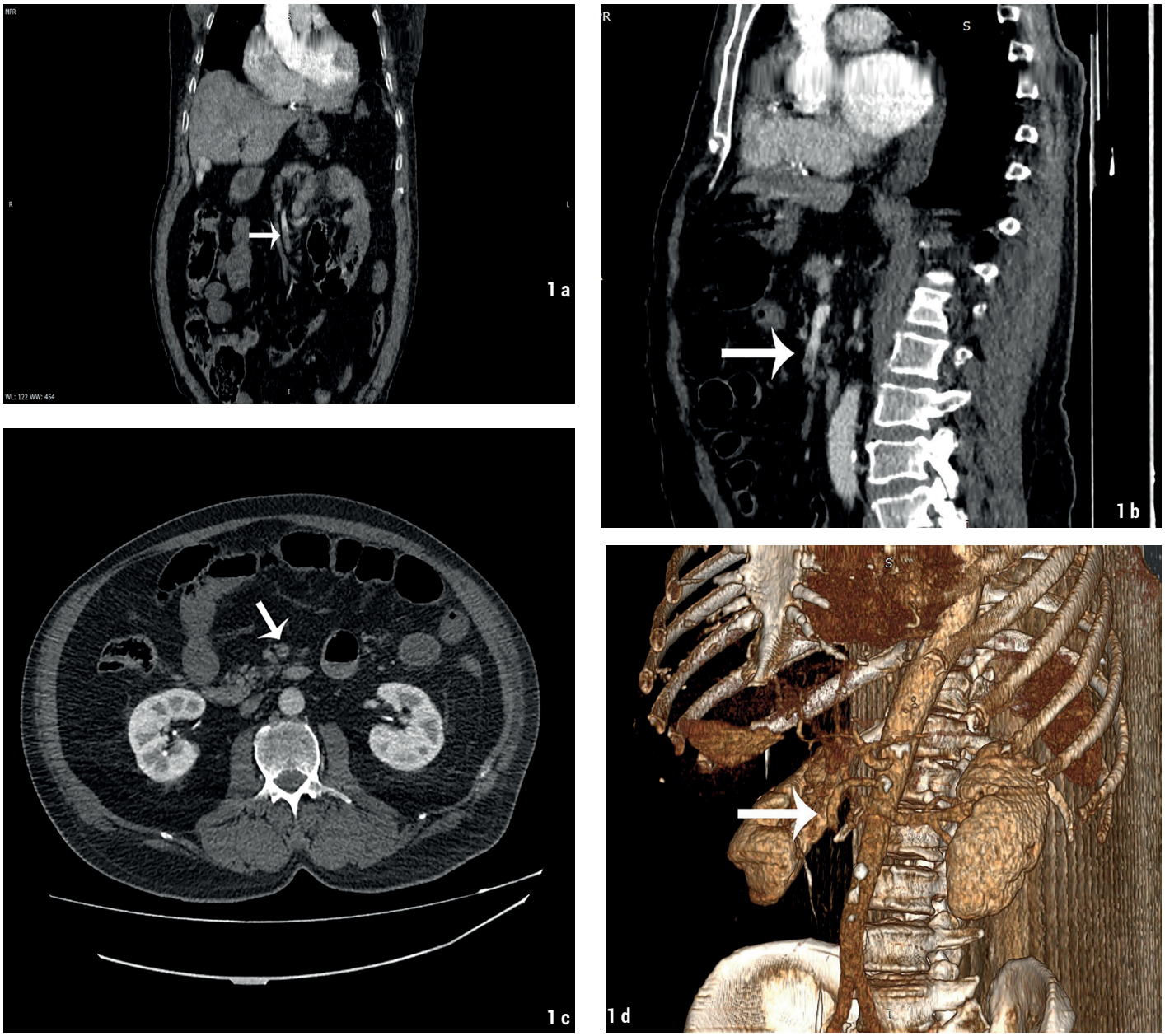


**Figure 1a).** A thrombus material in the SMA lumen, filling the lumen almost completely, causing a filling defect in the arterial phase CT angiography coronal section (arrow), b) sagittal section (arrow), c) Late-phase contrast axial images show near-toletal thrombus material in the SMA lumen, but the intestinal wall thickness is relatively normal, compatible with the early stage (arrow) d) In preoperative 3D reconstruction image, SMA appears to be totally occluded from 5 cm distal (arrow)

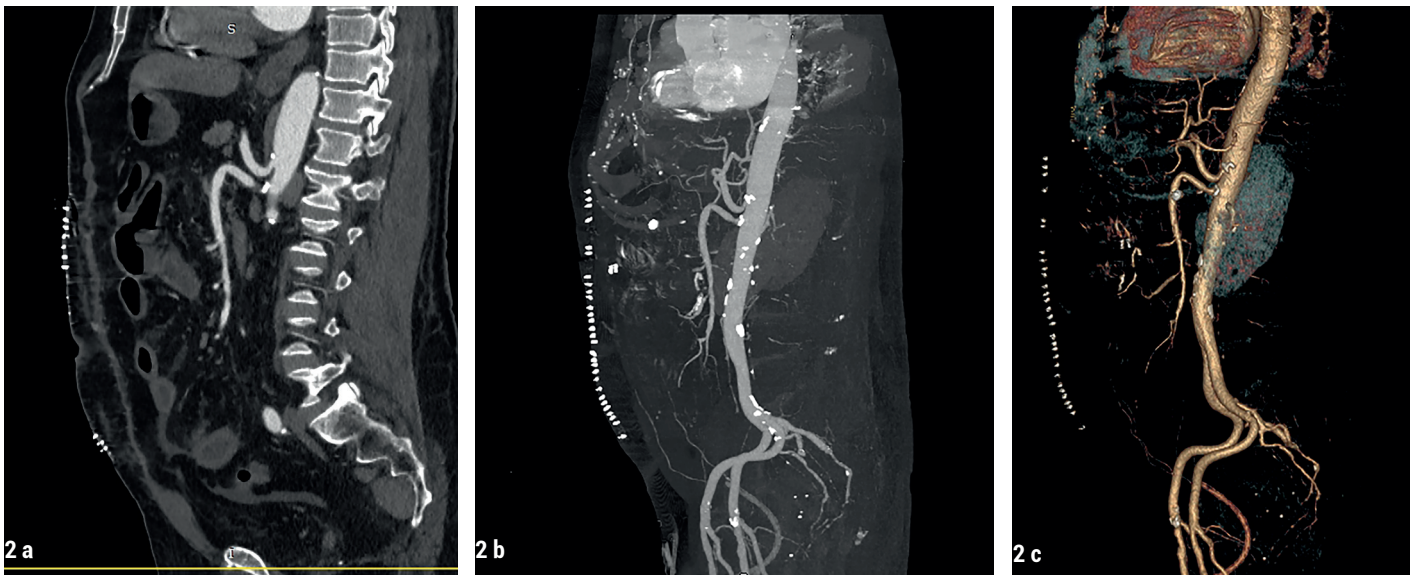


**Figure 2a)** CT angiography in sagittal section, b) Substraction BT angiography image c) 3D reconstruction BT angiography image shows nonobstructive calcific plaques in the celiac artery and SMA. Although SMA has wall irregularities in the mid-distal section, the lumen is open and its filling is natural, jejunal and ileal branches can be seen.

**Figure 3.** First post-operative view. The trocar placed for the second-look laparoscopy is seen in the lower left quadrant.

## DISCUSSION

Mesenteric ischemia appears as two different clinical syndromes, acute and chronic (8). The most common cause of acute mesenteric ischemia is an arterial embolism, with an average of 50% (3.9). Arterial embolism is frequently of cardiac origin and patients have cardiac diseases such as atrial fibrillation or chronic heart failure (10). Mucosal changes due to ischemia start at 3 hours and intestinal infarction starts at 6 hours (11). In patients with suspected mesenteric ischemia, CT angiography should be performed as soon as possible (12). For this reason, early diagnosis and timely surgical intervention is the basic approach and it is also necessary to reduce mortality (7). Open SMA embolectomy is an effective method in the treatment of acute mesenteric ischemia (13). The procedures for revascularization of the intestine and intestinal resections can be performed in the first operation and save lives (1,10). The planned second-look laparoscopy can be used to evaluate intestinal viability (14). Our patient was operated for the second time, 12 hours after the first operation. Resection was performed in the ischemic 60 cm small bowel loops. In the patient who had no signs of intra-abdominal sepsis and peritonitis, the ends of the proximal and distal bowel loops were cut, and it was seen that bleeding was sufficient and anastomosed end-to-end.

Every patient with mesenteric ischemia needs urgent diagnosis and treatment. After diagnosis, intravascular fluid replacement should be performed to stabilize the patient's hemodynamics. The increase in ischemic parts of the intestines and general endothelial damage occur within a few hours. Early intervention is essential in treatment. Percutaneous Transluminal Angiography is most commonly used. Meanwhile, stenting procedures can be performed. Other endovascular techniques include percutaneous aspiration thrombectomy, local fibrinolysis, or arterial drug perfusion (such as heparin or papaverine) (4). To prevent thromboembolic cascade in patients diagnosed with mesenteric ischemia, emergency anticoagulation should be performed with 1 mg / kg heparin IV or continuous heparin / 24-hour perfusion per day. Antibiotic treatment should be started together for the intestinal flora (11). In this case, after diagnosis of AMI, the patient was given low molecular weight heparin (Enoxaparin sodium-Clexane®, 1 mg / kg per day) and piperacillin - tazobactam 3x4.5 g treatment. With discharge,

anticoagulant therapy with enoxaparin was continued until the patient received oral anticoagulant (Warfarin-Na). When the patient was stabilized, echocardiography was performed. No endocardial pathology was observed. Unless contraindications are available, patients with embolism should be treated with lifetime anticoagulation to reduce the risk of recurrence (4). In this case, INR value was planned to be kept 2.5-3.5.

As with hypovolemic and septic shock, ischemic reperfusion injury can occur as a result of the collapse of the systemic circulation and is associated with high morbidity and mortality (15). Free oxygen radicals, which cause ischemia-reperfusion injury, can be formed by restoring perfusion in patients undergoing SMA embolectomy. Due to the high mortality and morbidity of ischemia-reperfusion injury, close follow-up is important in patients undergoing SMA embolectomy. In such patients, the necessity of relaparotomy and intestinal resection may arise. Glutamine-based foods and antioxidant-containing foods such as N-acetylcysteine contribute to preventing ischemia-reperfusion injury (15,16). There are many protocols for this purpose today.

## CONCLUSION

In this case, we wanted to emphasize that the open SMA embolectomy method is effective in the treatment of acute mesenteric ischemia and that planned second-view laparoscopy method can be applied, so that intestinal necrosis due to ischemia-reperfusion injury can be detected, and mortality and morbidity can be reduced with close follow-up. During follow-ups, repeated resections can be performed with third and fourth looks if necessary.

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*Patient informed consent: Written informed consent was given by the patient's parents.*

## REFERENCES

1. Hevér T, Fórizs Z, Lóderer Z. Operative treatment of acute mesenteric ischaemia. Magy Seb 2018;71:149-54.
2. Grotelüschen R, Bergmann W, Welte M, et al. What predicts the outcome in patients with intestinal ischemia? A single center experience. J Visc Surg 2019;156:405-11.
3. Clair DG, Jocelyn MB. Mesenteric ischemia. N Engl J Med 2016;374:959-68.
4. Tilsed JVT, Casamassima A, Kurihara H, et al. ESTES guidelines: acute mesenteric ischaemia. Eur J Trauma Emerg S 2016;42:253-70.
5. Wyers M, Fahad S. In Patients with Acute Mesenteric Ischemia Does an Endovascular or Hybrid Approach Improve Morbidity and Mortality Compared to Open Revascularization?. In: Skelly C., Milner R. eds Difficult Decisions in Vascular Surgery. Difficult Decisions in Surgery: An Evidence-Based Approach. Springer, Cham, 2017;221-33.
6. Swerdlow NJ, Varkevisser RR, Soden PA, et al. Thirty-day outcomes after open revascularization for acute mesenteric ischemia from the american college of surgeons national surgical quality improvement program. Ann Vasc Surg 2019;61:148-55.
7. Bala M, Kashuk J, Moore EE, et al. Acute mesenteric ischemia: guidelines of the World Society of Emergency Surgery. World J Emerg Surg 2017;12:38.
8. Lawson RM, Mesenteric Ischemia. Crit Care Nurs Clin North Am 2018;30:29-39.
9. Acosta S. Mesenteric ischemia. Curr Opin Crit Care 2015;21:171-8.
10. Monita MM, Lorena G. Mesenteric Ischemia, Acute. [Updated 2019 May 5] StatPearls [Internet]. StatPearls Publishing 2020:1-14.
11. Klar E, Rahmanian PB, Bücker A, et al. Acute mesenteric ischemia: a vascular emergency. Dtsch Arztebl Int 2012;109:249.
12. Kirkpatrick IDC, Kroeker MA, Greenberg HM. Biphasic CT with mesenteric CT angiography in the evaluation of acute mesenteric ischemia: initial experience. Radiology 2003;229:91-8.
13. Yun WS, Lee KK, Cho J, et al. Treatment outcome in patients with acute superior mesenteric artery embolism. Ann Vasc Surg 2013;27:613-20.
14. Yanar H, Taviloglu K, Ertekin C, et al. Planned second-look laparoscopy in the management of acute mesenteric ischemia. World J Gastroenterol 2007;13:3350.
15. Mallick IH, Yang W, Winslet MC, et al. Ischemia-reperfusion injury of the intestine and protective strategies against injury. Dig Dis Sci 2004;49:1359-77.
16. Gonzalez LM, Adam JM, Anthony TB. Animal models of ischemia-reperfusion-induced intestinal injury: progress and promise for translational research. Am J Physiol Gastrointest Liver Physiol 2014;308:63-75.