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Sequential Superior Mesenteric and Bilateral Renal Artery Embolism Managed With Staged Surgical and Endovascular Rescue: A Case Report

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Patient: Female, 77-year-old
Final Diagnosis: Superior mesenteric artery embolism with metachronous bilateral renal artery embolism
Symptoms: Acute abdominal and flank pain
Clinical Procedure: SMA embolectomy • bowel resection • aspiration thrombectomy
Specialty: Gastroenterology and Hepatology

Objective: Rare coexistence of disease or pathology

Background: Acute mesenteric ischemia due to superior mesenteric artery embolism is associated with high mortality. Embolism to other visceral arteries shortly after treatment is rare. We report a case of bilateral renal artery embolism after emergency surgery for superior mesenteric artery embolism in a patient later diagnosed with pancreatic cancer.

Case Report: A 77-year-old woman with previous non-cardioembolic cerebral infarction presented with sudden severe abdominal pain. Contrast-enhanced computed tomography showed complete superior mesenteric artery occlusion with impending bowel necrosis. Emergency laparotomy was chosen over catheter-based therapy. Superior mesenteric artery embolectomy, extensive small-bowel resection, and right hemicolectomy were performed, preserving 140 cm of proximal jejunum. A jejunostomy was created, with the transverse colon stump fixed beside it for later closure. During activated partial thromboplastin time (APTT)-guided heparin therapy for newly detected atrial fibrillation, she developed sudden abdominal and flank pain 32 hours postoperatively. The APTT was within the therapeutic range at symptom onset. Repeat computed tomography revealed bilateral renal artery emboli. Emergency catheter aspiration thrombectomy restored renal perfusion, and renal function recovered. Stoma closure was performed on postoperative day 56, and she was discharged with independent oral intake and ambulation. Pancreatic cancer was diagnosed approximately 3 months after discharge.

Conclusions: New abdominal or flank pain after treatment of superior mesenteric artery embolism should prompt immediate reassessment and repeat imaging even if the APTT is therapeutic. Atrial fibrillation was a plausible embolic source, but occult cancer-associated hypercoagulability may also have contributed. Bowel-preserving surgery and early renal thrombectomy may be feasible in selected patients.

Keywords: Atrial Fibrillation • Embolism • Mesenteric Ischemia • Renal Artery Obstruction • Case Reports
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Introduction

Acute mesenteric ischemia (AMI) is a severe vascular emergency associated with high morbidity and mortality [1]. Embolic occlusion of the superior mesenteric artery (SMA) is a major cause of AMI and commonly occurs in patients with atrial fibrillation [2]. Although the SMA is the primary site of embolism, embolic involvement of other visceral arteries, including the renal arteries, has also been reported [3-6].

Previous case reports have described SMA embolism accompanied by renal infarction or renal artery embolism [4-6]. However, reports of sequential bilateral renal artery embolism in the immediate postoperative period after surgery for SMA embolism are limited. Such a clinical course raises important questions regarding early recognition of recurrent embolic events, assessment of the embolic source, and coordination of surgical and endovascular treatment.

We report a case of acute SMA embolism requiring emergency surgery, followed by metachronous bilateral renal artery embolism during postoperative activated partial thromboplastin time (APTT)-guided heparin therapy. The aim of this report is to describe the clinical course and management of sequential SMA and bilateral renal artery embolism.

Case Report

A 77-year-old woman (height, 146 cm; weight, 43 kg) with a history of hypertension and prior non-cardioembolic cerebral infarction presented to our emergency department with sudden severe epigastric pain and vomiting. She was taking oral cilostazol 100 mg/day for secondary stroke prevention and was not on anticoagulant therapy. She had no documented history of atrial fibrillation; previous electrocardiograms had shown sinus rhythm, and Holter monitoring approximately 18 months before admission had not detected paroxysmal atrial fibrillation.

On arrival, she was alert but agitated because of severe pain. Her blood pressure was 156/106 mm Hg, heart rate was 164 beats/min and irregular, and respiratory rate was 40 breaths/min. The abdomen was distended but soft, without signs of peritonitis. Initial laboratory findings showed an elevated D-dimer level of 2.1 μg/mL (**Table 1**). Arterial blood gas analysis revealed a pH of 7.710, pCO_2 of 12.0 mm Hg, HCO_3^- of 15.2 mmol/L, and lactate of 4.8 mmol/L. Emergency transthoracic echocardiography (TTE) showed atrial fibrillation with a rapid ventricular response and no visible intracardiac thrombus. Continuous inpatient cardiac monitoring confirmed atrial fibrillation. Contrast-enhanced computed tomography (CT) showed complete SMA occlusion at the origin of the second jejunal artery, proximal to the middle colic artery (**Figure 1**). Bowel-wall enhancement was markedly decreased, suggesting impending transmural necrosis. No renal artery occlusion or renal perfusion defect was seen. Retrospective review of this CT scan showed mild dilatation of the main pancreatic duct but no definite pancreatic mass. No specific evaluation for occult malignancy, including tumor marker testing, was performed during the index admission because malignancy was not clinically suspected at that time.

A 5000-U intravenous bolus of heparin was administered. Catheter-based therapy was considered, but emergency laparotomy was chosen because the CT findings suggested impending transmural necrosis, which required direct inspection of the bowel and possibly immediate resection. At laparotomy, the bowel was ischemic from approximately 40 cm distal to the ligament of Treitz to the ascending colon. Through a transverse arteriotomy of the SMA, embolectomy was performed with a Fogarty catheter, and pulsatile flow was restored after 3 passes.

After revascularization, the color of the jejunum recovered up to approximately 100 cm from the ligament of Treitz. The following approximately 40 cm showed patchy mucosal ischemic changes, although peristalsis was preserved. The jejunum was divided 140 cm distal to the ligament of Treitz, and the distal small intestine was resected together with a right hemicolectomy. Because the viability of the distal jejunum was marginal, a single-barrel jejunostomy was created instead of a primary anastomosis. To facilitate later stoma closure, the transverse colon stump was fixed to the jejunal limb beneath the abdominal wall with non-absorbable sutures (**Figure 2A, 2B**). A Witzel gastrostomy was performed for postoperative decompression and enteral nutrition.

Continuous intravenous unfractionated heparin was started after surgery. The dose was increased stepwise to 15 000 U/day by 26 hours after surgery to reach the institutional target APTT of 1.5-2.0 times the baseline value. Repeat TTE after surgery showed no visible intracardiac thrombus.

At 32 hours after surgery, the patient developed acute abdominal and flank pain. At that time, her APTT was 56.6 seconds (baseline, 30.1 seconds), 1.88 times the baseline value. Emergency CT showed new bilateral renal artery embolism (RAE) involving the left renal artery trunk and a distal branch of the right renal artery (**Figure 3**). Given the risk of irreversible renal dysfunction, emergency aspiration thrombectomy via a femoral approach was performed, and perfusion of both kidneys was restored (**Figure 4**). Transesophageal echocardiography (TEE) performed after renal revascularization showed spontaneous echo contrast and a left atrial appendage flow velocity of 28-36 cm/s, with no thrombus in the left atrium or left atrial appendage. Serum creatinine increased transiently from 0.58 mg/dL to 1.97 mg/dL and then decreased to 0.81 mg/dL.

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Table 1. Initial laboratory findings on admission.

Variables	Values	Variables	Values
Hematology		**Biochemistry**	
White blood cells	6200/μL	Total protein	6.6 g/dL
Red blood cells	4.75×10^6/μL	Albumin	4.0 g/dL
Hemoglobin	14.8 g/dL	AST	58 U/L
Platelets	19.0×10^4/μL	ALT	61 U/L
Coagulation		LDH	643 U/L
PT-INR	1.03	BUN	12.8 mg/dL
APTT	30.1 sec	Creatinine	0.58 mg/dL
D-dimer	2.1 μg/mL	CRP	0.06 mg/dL
Fibrinogen	344 mg/dL	**Arterial blood gas**	
Antithrombin III	101%	pH	7.71
		pCO_2	12.0 mm Hg
		HCO_3^-	15.2 mmol/L
		Lactate	4.8 mmol/L (43 mg/dL)

PT-INR, prothrombin time-international normalized ratio; APTT, activated partial thromboplastin time; AST, aspartate aminotransferase; ALT, alanine aminotransferase; LDH, lactate dehydrogenase; BUN, blood urea nitrogen; CRP, C-reactive protein.

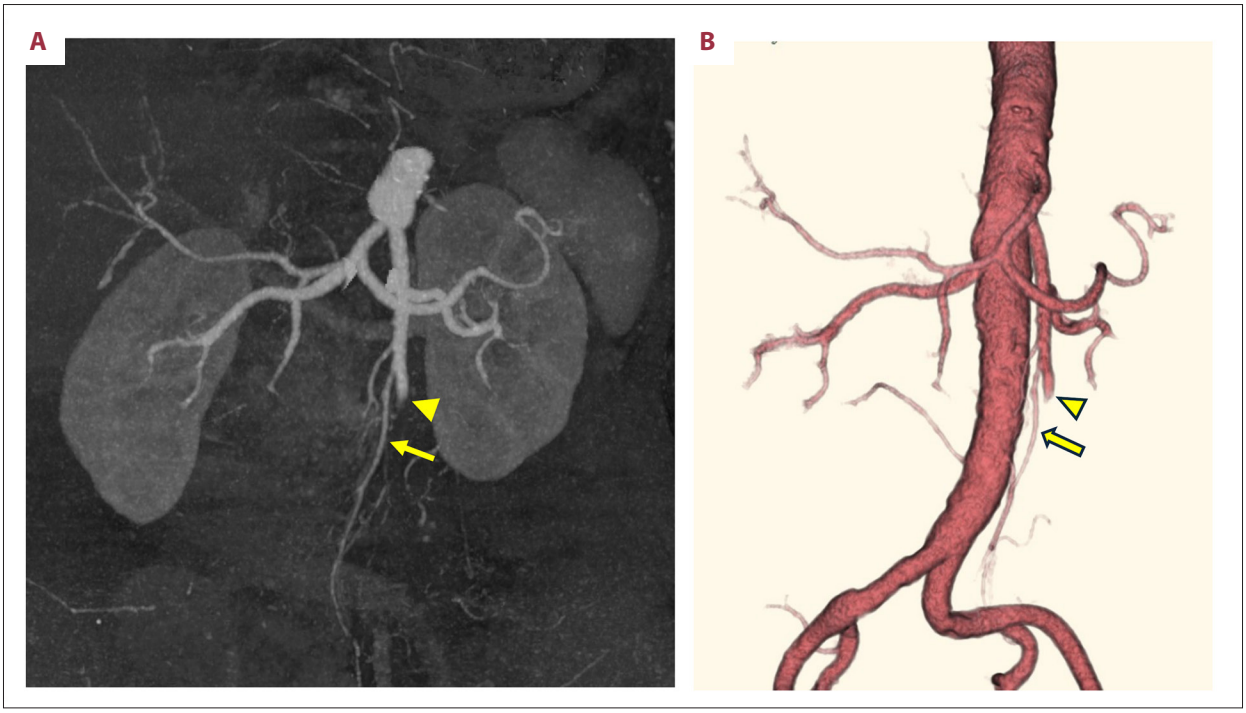


Figure 1. Preoperative computed tomography findings. (**A**) Coronal maximum intensity projection and (**B**) three-dimensional volume-rendered images showing thromboembolic occlusion of the superior mesenteric artery at the origin of the second jejunal artery. The arrowheads indicate the site of superior mesenteric artery occlusion, and the arrows indicate the second jejunal artery.

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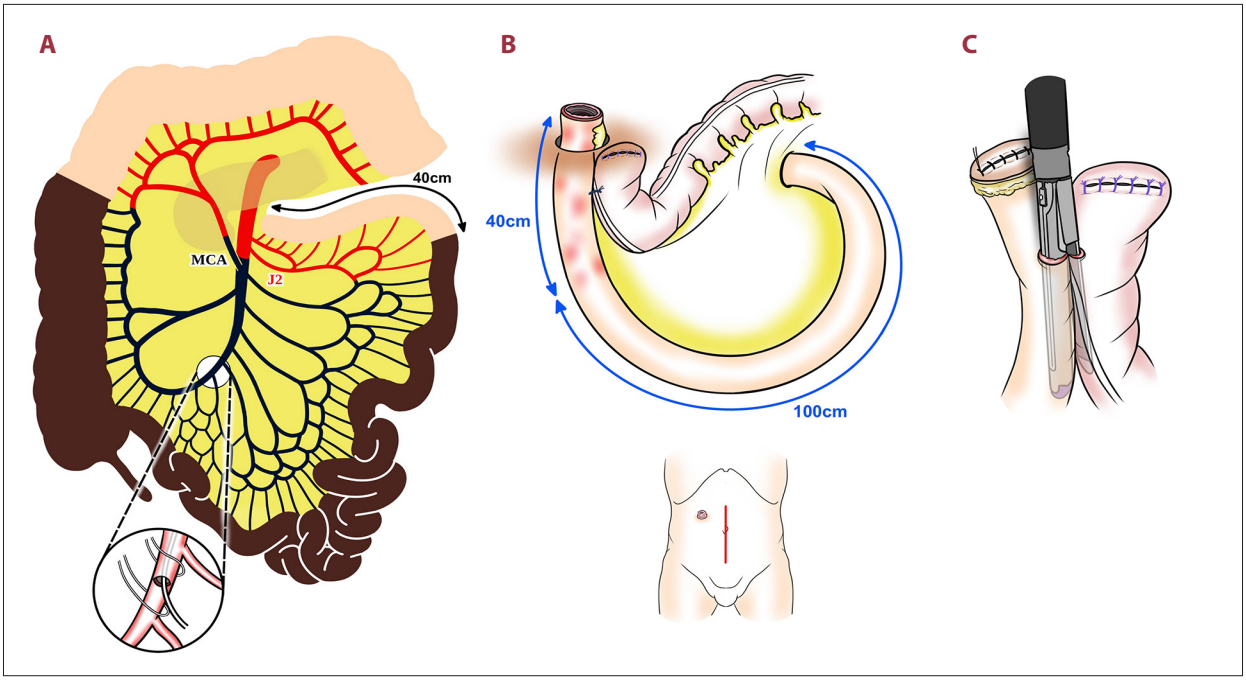


Figure 2. Schematic illustrations of the staged surgical strategy. (**A**) Initial emergency surgery. Preoperative computed tomography demonstrated superior mesenteric artery occlusion at the origin of the second jejunal artery. Intraoperatively, extensive ischemia was identified from approximately 40 cm distal to the ligament of Treitz to the ascending colon (dark brown areas). Superior mesenteric artery embolectomy using a Fogarty catheter improved blood flow in a portion of the jejunum. (**B**) Jejunostomy after massive bowel resection. A jejunostomy was created at 140 cm from the ligament of Treitz. In the distal 40-cm segment, patchy mucosal ischemic changes were observed. The transverse colon stump was secured to the elevated jejunal limb beneath the abdominal wall at the stoma site using non-absorbable sutures. (**C**) Minimally invasive stoma closure. Fifty-six days postoperatively, a functional end-to-end anastomosis was performed using a linear stapler through a limited circumferential skin incision around the stoma. MCA, middle colic artery; J2, second jejunal artery.

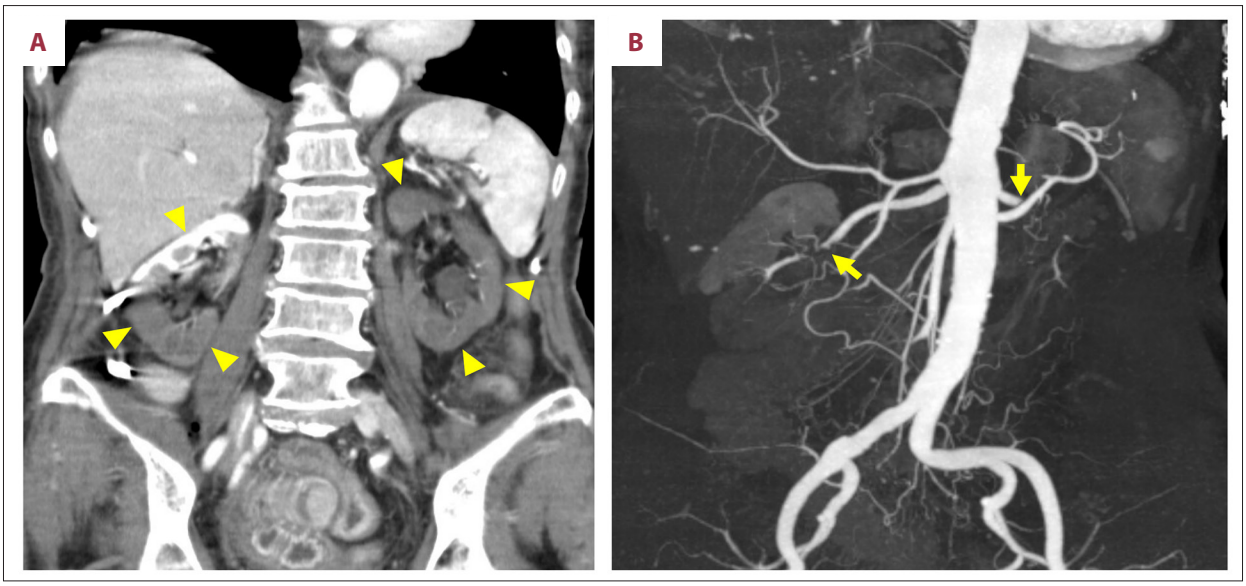


Figure 3. Computed tomography findings of metachronous bilateral renal artery embolism. (**A**) Coronal contrast-enhanced computed tomography showing absence of parenchymal enhancement in the left kidney and segmental enhancement limited to the upper pole of the right kidney, with a sharply demarcated perfusion boundary. The arrowheads indicate the outlines of both kidneys. (**B**) Coronal maximum intensity projection image demonstrating complete occlusion of the left renal artery origin and distal occlusion of the right renal artery (arrows).

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Figure 4. Selective angiography during emergency endovascular rescue. Post-thrombectomy selective angiography demonstrating successful restoration of perfusion in the (**A**) left and (**B**) right kidneys.

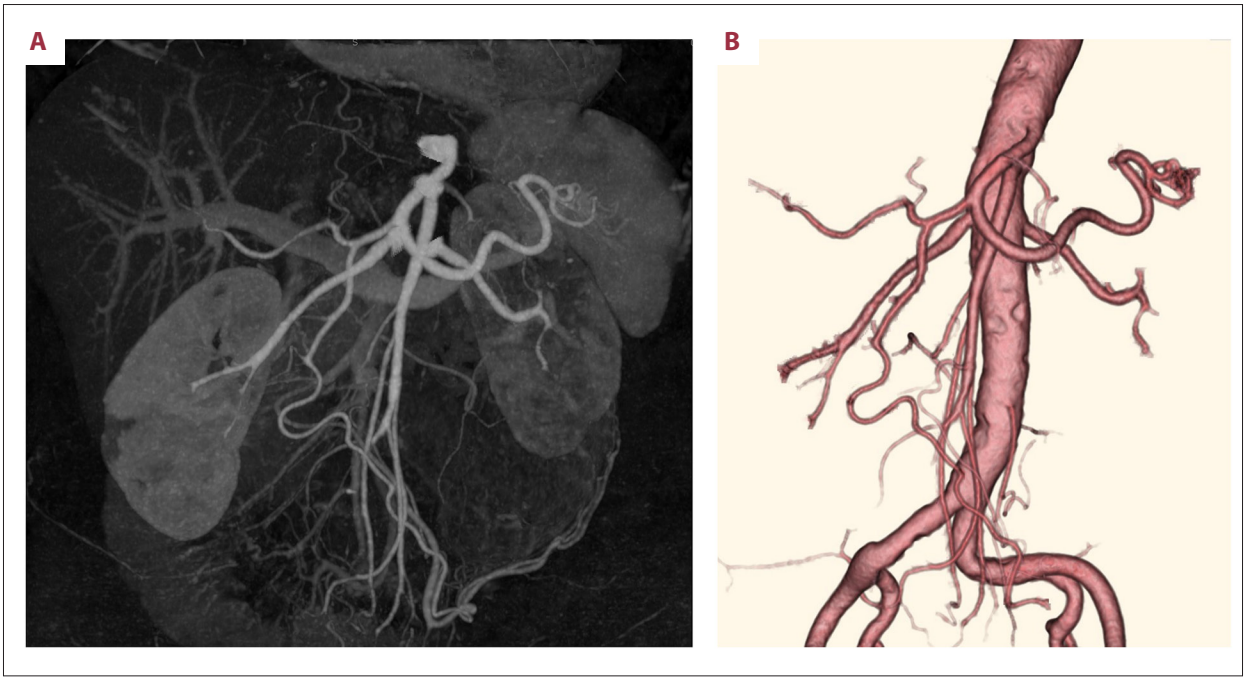


Figure 5. Follow-up computed tomography on postoperative day 23. (**A**) Coronal maximum intensity projection and (**B**) three-dimensional volume-rendered images confirming patent bilateral renal arteries and a well-perfused superior mesenteric artery.

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An elemental diet was initiated via gastrostomy on postoperative day (POD) 11, and oral intake was resumed on POD 14. Follow-up CT on POD 23 confirmed widely patent bilateral renal arteries and a well-perfused SMA (**Figure 5**). Stoma closure was performed on POD 56. Because the colonic stump had been fixed near the stoma, it was easily identified through a limited circumferential skin incision, and a functional end-to-end anastomosis was performed with a linear stapler (**Figure 2C**). She was discharged with independent oral intake and ambulation. Warfarin was prescribed for long-term anticoagulation because of unstable nutritional status, possible variable drug absorption after extensive bowel resection, and the need for close monitoring of the anticoagulant effect. During outpatient follow-up, she maintained nutritional autonomy with oral intake alone and did not require parenteral nutrition.

Approximately 3 months after discharge, follow-up CT revealed a pancreatic head mass, and fine-needle aspiration confirmed pancreatic cancer. She received treatment for the cancer but died of the disease approximately 10 months after the final surgery. Her oral intake and digestive function remained preserved until the terminal phase.

Discussion

The main lesson from this case is that new abdominal or flank pain after SMA embolism warrants immediate reassessment and repeat contrast-enhanced CT, even when the APTT is within the therapeutic range at symptom onset. In this patient, repeat imaging led to early recognition of metachronous bilateral RAE and prompt endovascular treatment, after which renal function recovered.

Regarding the initial SMA embolism, the principal management question was whether to prioritize catheter-based therapy or immediate laparotomy. Early diagnosis is important in AMI [1]. Although no single laboratory parameter is diagnostic, severe pain disproportionate to the physical findings, together with elevated lactate and D-dimer levels, increased clinical suspicion and prompted urgent contrast-enhanced CT [1]. In this patient, CT showed severe bowel hypoperfusion with decreased wall enhancement, suggesting impending transmural necrosis. Although catheter-based therapy was considered, revascularization alone would not have allowed direct assessment or immediate resection of potentially nonviable bowel. Immediate laparotomy was therefore chosen to permit bowel assessment, revascularization, and resection when required.

The subsequent bilateral RAE was difficult to recognize because it developed during APTT-guided heparin therapy. The initial CT showed no renal artery occlusion or perfusion defect, indicating that the renal emboli developed later. At 32 hours postoperatively, the APTT was within the institutional therapeutic range. However, this single measurement does not establish that anticoagulation had remained continuously therapeutic while the heparin dose was being titrated. Unfractionated heparin is intended to prevent further thrombus formation and propagation but does not eliminate pre-existing thrombotic material [7]. The renal emboli may therefore have represented either a new embolic event or migration or progression of pre-existing thrombotic material; the available data cannot distinguish among these possibilities. The short interval from heparin initiation to the recurrent event, together with stable platelet counts, made heparin-induced thrombocytopenia clinically unlikely.

Previous reports have described SMA embolism accompanied by renal infarction or renal artery embolism in association with atrial fibrillation or endocarditis [4-6]. In a report by Lin et al [4], SMA embolism with renal infarction associated with atrial fibrillation was treated with anticoagulation without emergency bowel surgery. Yamaguchi et al [5] reported a patient with atrial fibrillation in whom right renal artery embolism and SMA embolism were both identified at initial presentation; emergency laparotomy revealed no bowel necrosis, and no bowel resection was required. Raizada et al [6] reported SMA embolism and renal infarction that were both present at initial presentation in the setting of Q fever endocarditis and were treated with SMA embolectomy and aortic valve replacement. In all 3 previously reported cases [4-6], renal involvement was already present at the initial presentation. In contrast, in the present case, bilateral RAE was absent on the initial CT and developed clinically 32 hours after surgery for SMA embolism, requiring repeat imaging and urgent bilateral renal revascularization.

Although no left atrial or left atrial appendage thrombus was identified on TEE, spontaneous echo contrast and reduced left atrial appendage flow velocity suggested left atrial blood stasis. These findings made atrial fibrillation a plausible cardioembolic source but did not establish it as the definitive cause. Pancreatic cancer was diagnosed approximately 3 months after discharge. Although venous thromboembolism is more common, arterial thromboembolic events, including ischemic stroke, have also been reported in patients with pancreatic cancer [8]. The short interval between the embolic events and the cancer diagnosis raises the possibility that an occult malignancy-associated hypercoagulable state may already have been present and may have contributed to the sequential arterial embolic events. However, the relative contributions of atrial fibrillation and malignancy-associated hypercoagulability cannot be determined retrospectively.

Although conservative management may be appropriate in selected unilateral renal infarctions [9,10], bilateral RAE carries a

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substantial risk of irreversible renal dysfunction. Previous reports have described successful endovascular thrombectomy for acute renal artery embolism [11,12]. In our patient, prompt aspiration thrombectomy restored bilateral renal perfusion without hemorrhagic complications. Preserving renal function was particularly important after extensive bowel resection because renal dysfunction would have complicated fluid and nutritional management.

Preservation of 140 cm of proximal jejunum was also important for subsequent nutritional recovery. Long-term nutritional autonomy may be possible with this amount of residual small bowel, depending on the remaining anatomy and intestinal continuity [13]. Because the distal 40 cm of the preserved jejunum remained of marginal viability, a jejunostomy was created rather than a primary anastomosis. Serum lactate normalized within 24 hours, hemodynamic stability was maintained without vasopressor support, and the exteriorized bowel mucosa could be observed serially through the stoma; therefore, a planned second-look laparotomy was not performed.

Fixing the transverse colon stump to the elevated jejunal limb at the initial operation made the stump easy to identify later and reduced the need for extensive adhesiolysis. Stoma closure could therefore be completed through a limited circumferential incision without additional small-bowel resection, preserving the entire 140-cm remnant and allowing early resumption of oral intake.

This sequence of care depended on several case-specific factors, including imaging findings that required direct bowel inspection, successful preservation of 140 cm of proximal jejunum, postoperative hemodynamic stability, recognition of new symptoms, and immediate access to endovascular treatment. These conditions may not be present in other patients.

This report has several limitations. First, although repeated TTE did not reveal intracardiac thrombi, TTE cannot reliably exclude left atrial appendage thrombus, for which TEE remains the reference standard [14]. Because TEE was performed only after the embolic events, it cannot establish whether a left atrial or left atrial appendage thrombus had been present earlier. Second, anti-Xa level monitoring and formal evaluation for inherited or acquired thrombophilias were not performed before the recurrent embolic event. The mechanism of the recurrent emboli therefore remains uncertain. Finally, as this is a single case report, the generalizability of this multidisciplinary strategy is limited. Nevertheless, this case may illustrate a feasible approach to organ preservation in carefully selected patients with complex sequential visceral embolism.

Conclusions

In this patient with sequential SMA embolism and bilateral RAE, bowel-preserving emergency surgery, prompt endovascular renal rescue, and planned stoma reconstruction were associated with recovery of renal function and preservation of oral nutritional autonomy. New abdominal or flank pain after SMA embolism should prompt immediate clinical reassessment and repeat imaging, even when the APTT is within the institutional therapeutic range at symptom onset. Atrial fibrillation was a plausible embolic source, although occult cancer-associated hypercoagulability may also have contributed. This staged approach may be feasible in selected patients.

Institution Where Work Was Done

Japanese Red Cross Okayama Hospital, Okayama, Japan.

Patient Permission/Consent Declarations

Written informed consent was obtained from the patient for the publication of this case report and accompanying images.

AI Disclosure

During the preparation of this manuscript, the authors used ChatGPT (OpenAI) for English-language editing and improvement of clarity. All AI-assisted text was critically reviewed and revised by the authors, who take full responsibility for the content.

Declaration of Figures' Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

References:

1. Bala M, Catena F, Kashuk J, et al. Acute mesenteric ischemia: Updated guidelines of the World Society of Emergency Surgery. World J Emerg Surg. 2022;17:54
2. Acosta S, Ogren M, Sternby NH, et al. Clinical implications for the management of acute thromboembolic occlusion of the superior mesenteric artery: Autopsy findings in 213 patients. Ann Surg. 2005;241:516-22
3. Frost L, Engholm G, Johnsen S, et al. Incident thromboembolism in the aorta and the renal, mesenteric, pelvic, and extremity arteries after discharge from the hospital with a diagnosis of atrial fibrillation. Arch Intern Med. 2001;161:272-76
4. Lin PH, Liang CY, Huang PY. Superior mesenteric embolus accompanied by renal infarction associated with atrial fibrillation successfully treated by anticoagulants: A CARE-compliant case report. Medicine (Baltimore). 2025;104:e46740

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Indexed in: [PMC] [PubMed] [Emerging Sources Citation Index (ESCI)] [Web of Science by Clarivate]

5. Yamaguchi T, Takeuchi S, Yamakawa H, et al. [A case of renal artery embolism complicated by superior mesenteric artery embolism.] Rinsho Zasshi Naika. 2004;93:964 [in Japanese]
6. Raizada A, Apte N, Pham S. Q fever endocarditis presenting with superior mesenteric artery embolism and renal infarction. Tex Heart Inst J. 2016;43:91-93
7. Nutescu EA, Burnett A, Fanikos J, et al. Pharmacology of anticoagulants used in the treatment of venous thromboembolism. J Thromb Thrombolysis. 2016;41:15-31
8. Campello E, Ilich A, Simioni P, Key NS. The relationship between pancreatic cancer and hypercoagulability: A comprehensive review on epidemiological and biological issues. Br J Cancer. 2019;121:359-71
9. Bourgault M, Grimbert P, Verret C, et al. Acute renal infarction: A case series. Clin J Am Soc Nephrol. 2013;8:392-98
10. Antopolsky M, Simanovsky N, Stalnikowicz R, et al. Renal infarction in the ED: 10-year experience and review of the literature. Am J Emerg Med. 2012;30:1055-60
11. Nie MX, Tian CR, Bao QW, et al. Interventional therapy for bilateral acute renal artery embolism caused by paroxysmal atrial fibrillation. Chin Med J (Engl). 2016;129:1244-45
12. Komolafe B, Dishmon D, Sultan W, et al. Successful aspiration and rheolytic thrombectomy of a renal artery infarct. Can J Cardiol. 2012;28:760.e1-.e3
13. Messing B, Crenn P, Beau P, et al. Long-term survival and parenteral nutrition dependence in adult patients with the short bowel syndrome. Gastroenterology. 1999;117:1043-50
14. Beigel R, Wunderlich NC, Ho SY, et al. Cardiac imaging for assessment of left atrial appendage stasis and thrombosis. Nat Rev Cardiol. 2014;11:470-80

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