Mycotic superior mesenteric artery aneurysm with impending rupture due to infective endocarditis

Satoshi Sakakibara, MD, *and* Takashi Yamauchi, MD, PhD, *Osaka, Japan*

ABSTRACT

A 49-year-old woman with tachycardia was referred to our institution. Transthoracic echocardiography revealed severe mitral regurgitation, and surgery was planned. While awaiting surgery, she developed a fever. Transthoracic echocardiography and transesophageal echocardiography revealed vegetation on the mitral valve leaflet. Blood cultures were positive for *Streptococcus anginosus*. She was diagnosed with infective endocarditis, and antibiotics were administered. She experienced sudden abdominal pain 26 days after hospitalization. Contrast-enhanced computed tomography scan revealed a mycotic superior mesenteric artery aneurysm with impending rupture without intestinal ischemia, and aneurysm resection was performed. Mitral valve replacement was performed on postoperative day 10, with uneventful postoperative healing. (J Vasc Surg Cases Innov Tech 2024;10:101600.)

Keywords: Infective endocarditis; Superior mesenteric artery aneurysm; Impending rupture; Antibiotic therapy; Contrast-enhanced computed tomography

Superior mesenteric artery aneurysm (SMAA) is a life-threatening condition that causes intestinal ischemia and aneurysm rupture,[1] with a high mortality rate of 38% to 50%. The most common cause of an SMAA is infection, including infective endocarditis (IE).[2] Herein, we report a case of the surgical management of a mycotic SMAA that developed during antibiotic treatment for IE. The patient has given informed consent for the publication of this manuscript.

CASE REPORT

A 49-year-old female patient with tachycardia was referred to our institution. The patient's medical history was unremarkable; however, she presented with a systolic murmur that was faint but immediately audible on placing the stethoscope on the chest, consistent with a Levine 2/6 murmur. Transthoracic echocardiography revealed severe mitral regurgitation (MR) owing to A2, P1, and P3 prolapse. Therefore, elective surgery was planned. However, the patient developed a fever without symptoms of heart failure while awaiting elective operation, and amoxicillin (250 mg three times daily) was initiated 3 days before hospitalization. Physical examination upon admission revealed a regular pulse rate of 85 bpm, a blood pressure of 90/56 mm Hg, and a body temperature of 37.7 °C. The systolic murmur was not substantially altered. Blood tests revealed a white blood cell count of 9700 cells per mm^3, with 82% neutrophils, a platelet count of 209,000 cells/μL, and a C-reactive protein level of 2.52 mg/dL. The renal and liver function tests were within normal limits. Transthoracic echocardiography and transesophageal echocardiography showed vegetation attached to the anterior leaflet of the mitral valve with a size of 4.2 mm and poor mobility. Blood cultures were positive for *Streptococcus anginosus*. Contrast-enhanced computed tomography (CT) scan indicated no aneurysms in the femoral artery or the abdominal aorta and its branches, including the superior mesenteric artery. Therefore, the patient was diagnosed with IE. In accordance with Japanese Circulation Society 2017 Guidelines on Prevention and Treatment of IE,[3] the antibiotic amoxicillin was changed to ampicillin (2 g 4 times daily). Surgery for MR was planned after 4 weeks of antibiotic therapy. The patient's condition remained stable (Fig 1). However, 26 days after admission, the patient experienced sudden abdominal pain. Contrast-enhanced CT scan revealed rapid enlargement of the superior mesenteric artery, with a diameter of 1.2 cm (Fig 2), and an absence of other conditions potentially causing abdominal pain. Therefore, mycotic SMAA with impending rupture was diagnosed. Because IE was not treated fully, and the patient could tolerate open surgery, we planned for aneurysm resection and evaluation of the intestinal blood flow. In addition, because of the possibility the patient requiring further surgery for IE in the early postoperative period, the most minimally invasive surgery possible was planned.

General anesthesia was induced, followed by the insertion of four-port tractors: two 12-mm trocars at the umbilicus and the left hypochondriac region and two 5-mm trocars at the median hypochondriac and left lumbar regions. Laparoscopic examination revealed no significant intestinal ischemia. The mycotic SMAA was identified distal to the ileocolic artery bifurcation (Fig 3, *A*). To preserve blood flow in the superior mesenteric artery region to the greatest extent possible, and to resect the

From the Department of Cardiovascular Surgery, Higashiosaka City Medical Center.

Correspondence: Satoshi Sakakibara, MD, Department of Cardiovascular Surgery, Higashiosaka City Medical Center, 3-4-5 Nishi iwata, Higashiosaka, Osaka 578-8588, Japan (e-mail: satoshi11130315@gmail.com).

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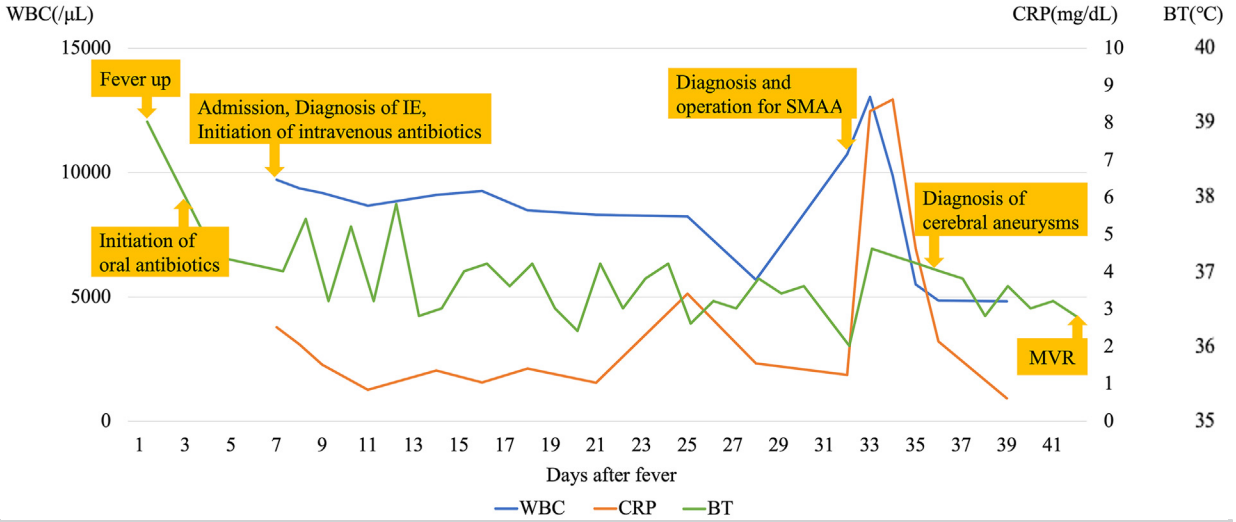

Fig 1. Clinical course after hospitalization. After the initiation of antibiotic treatment, the clinical course of IE was generally good. However, the patient was diagnosed with a mycotic SMAA and cerebral aneurysms 32 and 36 days after the onset of fever, respectively. MVR was performed 42 days after the onset of fever. *BT*, Body temperature; *CRP*, C-reactive protein; *IE*, infective endocarditis; *SMAA*, superior mesenteric artery aneurysm; *MVR*, mitral valve replacement; *WBC*, white cell count.

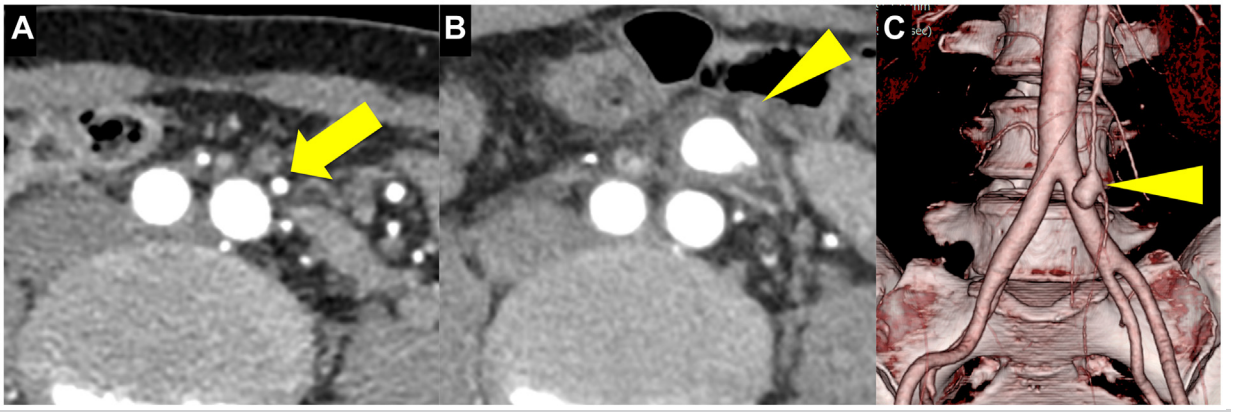

Fig 2. Preoperative CT. **(A)** CT performed at the time of admission shows a normal SMA. **(B** and **C)** CT performed when the patient experienced abdominal pain shows the expansion of the SMA without intestinal ischemia. *CT*, Computed tomography; *SMA*, superior mesenteric artery.

aneurysm completely, the SMAA was extracted from the abdominal cavity through an extended abdominal incision. Proximal and distal segments of the mycotic SMAA were clamped. Because the intraoperative indocyanine green imaging revealed no significant intestinal ischemia, aneurysm resection was performed without vascular reconstruction (Fig 3, *B*).

Postoperative histopathological analysis revealed a mycotic SMAA with impending rupture (Fig 3, *C*). Brain CT angiography was performed to evaluate the possibility of infective cerebral aneurysms, and revealed three infective cerebral aneurysms 4 days postoperatively. The diameter of the largest aneurysm was 1.7 mm. The other aneurysms were found to be pseudoaneurysms and as established by a high-density CT area. The patient had dyspnea on exertion of New York Heart Association class II, requiring oxygenation with nasal oxygen cannula. As the cause of MR was complex and there was a risk of perioperative cerebral bleeding owing to cardiopulmonary bypass and intraoperative anticoagulation, mitral valve replacement with a 29-mm MITRIS RESILIA mitral valve (Edwards Lifesciences, Irvine, CA), which does not necessarily require anticoagulation, was performed 10 days after the surgery. The total operating and cardiopulmonary bypass times were 124 and 72 minutes, respectively.

The postoperative course was uneventful and without cerebral bleeding. Postoperative anticoagulation was initiated with a low dose of warfarin. Antibiotics were continued for 6 weeks after blood cultures tested negative, and ampicillin was replaced with amoxicillin (250 mg three times daily). The patient was discharged 46 days after the surgery. Amoxicillin was continued

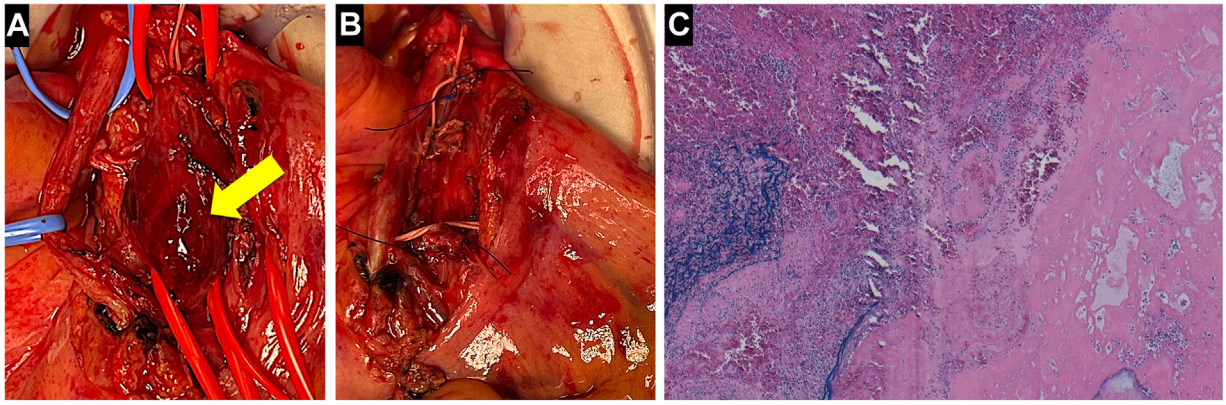

Fig 3. Intraoperative findings. **(A)** Location of the mycotic SMAA distal to the ileocolic artery bifurcation. ICG imaging shows no significant intestinal ischemia. **(B)** Therefore, only aneurysm resection was performed. **(C)** Postoperative histopathological analysis shows a partial deficit of the superior mesenteric artery wall and neutrophilic infiltration in and around this wall (hematoxylin and eosin staining, observed under ×40 magnification). *ICG*, Indocyanine green; *SMAA*, superior mesenteric artery aneurysm.

for 1 year. The infective cerebral aneurysms had disappeared without thrombosis and embolization 3 months postoperatively, and there were no signs of recurrence at 12 months postoperatively.

DISCUSSION

Aneurysmal involvement of the visceral arteries is a rare condition that constitutes 0.1% to 2% of all aneurysms. SMAA represents only 5.5% to 8.6% of visceral aneurysms.[4] The most common cause of an SMAA is an infection, including IE,[2] and the *Streptococcus* species is the most commonly identified pathogen.[5] In IE, the predilection sites for an infective aneurysm are the cerebral, femoral, and abdominal arteries, in that order. The abdominal artery aneurysms include the abdominal aorta and the superior mesenteric, hepatic, and splenic arteries.[6] SMAA is often asymptomatic but causes abdominal pain owing to intestinal ischemia or aneurysm rupture.[1,7] CT angiography is a valuable modality with advantages such as detecting synchronous or source lesions and aiding in intervention planning. Suggestive features include new aneurysm formation, rapid expansion or morphological changes of known aneurysms, intramural or perivascular gas, and soft tissue mass or stranding.[8] After aneurysm resection, a follow-up CT angiography is also useful to evaluate the possibility of anastomotics/stumps. Currently, there are no established guidelines for the treatment of a mycotic SMAA complicated by IE. Associations between SMAA diameter and aneurysm rupture are unclear. However, early treatment is necessary because of the high mortality rate of 38% to 50%.[1] Treatment of mycotic SMAA often involves the combination of antibiotics and surgery. There is no consensus on the duration of antibiotic therapy; most sources recommend 3 to 6 months[2,8] with discontinuation only when there is no clinical evidence of ongoing sepsis, normalized inflammatory markers, and negative blood cultures.[8] The type of surgery is debatable.[2] In most cases, aneurysmectomy with or without intestinal resection and revascularization was performed. Endovascular treatment, including stent grafting and embolization, is recommended only for patients who cannot be treated with open surgery.[2]

In the present case report, the development of a mycotic SMAA and cerebral aneurysms was observed during antibiotic treatment, which improved the patient's general condition initially. It is important to note that life-threatening mycotic peripheral aneurysms may occur even when IE is well-controlled with antibiotics as evidenced by stable fever and laboratory data. Therefore, clinicians should maintain a high index of suspicion, regardless of clinical status, especially if abdominal symptoms such as abdominal pain develop, and promptly perform a CT scan. The treatment approach for mycotic SMAA should be individualized based on factors including the status of IE treatment and the presence or absence of intestinal ischemia.

CONCLUSIONS

This report details a case of mycotic SMAA secondary to IE. Regardless of the clinical status of IE, if abdominal symptoms such as pain develop, a CT scan should be performed to investigate the potential presence of peripheral aneurysms, including SMAA. Treatment approaches for this condition need to be tailored according to certain factors, including the treatment status of IE, tolerance to open surgery, and the presence or absence of intestinal ischemia.

DISCLOSURES

None.

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