

# Superior mesenteric artery mycotic aneurysm repaired with bifurcated saphenous vein graft

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## ABSTRACT

A mycotic aneurysm of the superior mesenteric artery caused by *Enterococcus faecalis* was successfully treated with aneurysmectomy and reconstruction with a bifurcated saphenous vein graft. A 49-year-old man with a history of type 2 diabetes mellitus and a recent left transmetatarsal amputation for osteomyelitis presented to the emergency department with severe abdominal pain, an unexplained 30-lb weight loss, and wound dehiscence. Computed tomography angiography showed an aneurysm of the superior mesenteric artery and a splenic abscess. The patient underwent splenectomy, surgical resection of the aneurysm, and reconstruction with a bifurcated saphenous vein. Follow-up revealed normal gastrointestinal function and graft patency. (J Vasc Surg Cases Innov Tech 2023;9:101244.)

**Keywords:** Mycotic aneurysm; Saphenous vein graft; Vascular reconstruction; Visceral aneurysm

Visceral artery aneurysms are rare, with an incidence of 0.01% to 0.1%.<sup>1</sup> They are associated with a high risk of rupture at 25% to 40%, with rupture mortality approaching 76%.<sup>2</sup> The most common locations for visceral aneurysms are the splenic, followed by the hepatic and then superior mesenteric arteries (SMAs).<sup>3</sup> A less common cause of an aneurysm is infection (0.7%-3% of all aneurysms),<sup>4,5</sup> originally coined “mycotic” by Osler.<sup>6</sup> The treatment guidelines for visceral artery aneurysms differ based on their location but typically require operative repair.<sup>7</sup>

Mycotic aneurysms arise from an invasive organism effectuating vessel wall destruction, which leads to vascular dilation. These infections most commonly arise via hematogenous spread from infection with streptococcus (47%) or staphylococcus (28%).<sup>8</sup> Bacteremia is confirmed in 50% to 85% of cases.<sup>4</sup> Patients present with a classic pentad of symptoms, including abdominal pain, malaise, fever, weight loss, and anorexia.<sup>8</sup> The risk of progression to sepsis and rupture is high if not treated with antibiotics and, in most cases, surgery. Previous case reports have described treatment success with both open aneurysm resection without vascular reconstruction<sup>9,10</sup> and endovascular repair.<sup>8,11</sup>

To the best of our knowledge, no studies have reported the use of a bifurcated saphenous vein graft for a visceral mycotic aneurysm repair, with few reports of *Enterococcus faecalis* as the causative organism. The patient provided written informed consent for the report of his case details and imaging studies.

## CASE REPORT

A 49-year-old man with a history of hypertension, type 2 diabetes mellitus, and a recent left transmetatarsal amputation for osteomyelitis presented to the emergency department with a 3-week history of anorexia, abdominal pain, a recent unexplained 30-lb weight loss, and wound dehiscence. He presented with blood pressure of 149/98 mm Hg, pulse of 99 bpm, temperature of 37.2°C (98.9°F), respiratory rate of 20 breaths per minute, and oxygen saturation of 94%. Laboratory testing revealed microcytic anemia and leukocytosis ( $17.1 \times 10^9/L$ ). The initial diagnostic test was noncontrast-enhanced computed tomography (CT), which demonstrated findings consistent with multiple splenic abscesses (Fig 1) and potential occlusions within the SMA branches. Subsequent transesophageal echocardiography demonstrated endocarditis with mitral regurgitation and 2-cm mitral valve vegetations. A CT angiogram (CTA) revealed a thin-walled mass in the middle portion of the SMA, consistent with a mycotic aneurysm (Fig 2). Six hours after his presentation, intravenous (IV) meropenem 1000 mg every 8 hours and IV vancomycin 2500 mg were initiated. Blood cultures, obtained before the initiation of antibiotic treatment, resulted in positive *E. faecalis* growth on hospital day 2. A culture of the diabetic foot wound revealed a polymicrobial infection with heavy *E. faecalis* growth, indicating possible hematogenous spread from his wound.

Successive management involved continued IV antibiotics, CT-guided splenic abscess drain placement, and three CTAs within 15 days to monitor aneurysm progression. A splenic drain culture also yielded growth of *E. faecalis* before surgical intervention. The final CTA showed aneurysm persistence, with a maximum diameter of 3.3 cm (unchanged from the first imaging study). A three-dimensional aneurysm reconstruction is demonstrated

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Author conflict of interest: none.

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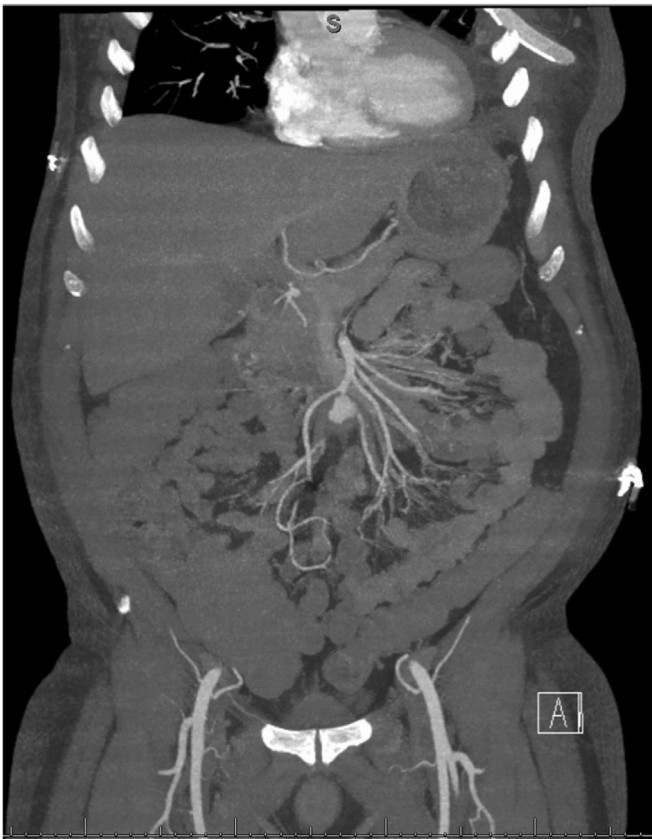
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<https://doi.org/10.1016/j.jvscit.2023.101244>



**Fig 1.** Computed tomography angiogram (CTA) demonstrating multiple splenic abscesses.



**Fig 2.** Computed tomography angiogram (CTA) before intervention.



**Fig 3.** Three-dimensional reconstruction of the superior mesenteric artery (SMA) aneurysm within the branching segment.

After splenectomy, the SMA and its side branches were controlled proximally and distally to the aneurysm, within the root of the small bowel mesentery. Reconstruction was thought necessary owing to the degree of small bowel perfused by the distal branches. Next, an accessory segment of the great saphenous vein (GSV) was identified in the proximal lower leg. The accessory GSV vessel and the GSV were joined distally to the knee and harvested for use as the conduit (Fig 4). The valves were lysed using a Mills valvulotome. After heparinization, the aneurysm was opened. Purulent drainage and chronic thrombus were removed. An intraoperative swab of the aneurysm revealed growth of *E. faecalis* 4 days postoperatively.

After aneurysm resection, an end-to-end anastomosis was created using a parachute technique between the bifurcated graft and SMA. Next, distal anastomoses were formed end to end with the two outflow vessels (Fig 5). Doppler ultrasound was used to confirm multiphasic flow. After thorough irrigation, the mesentery artery was closed.

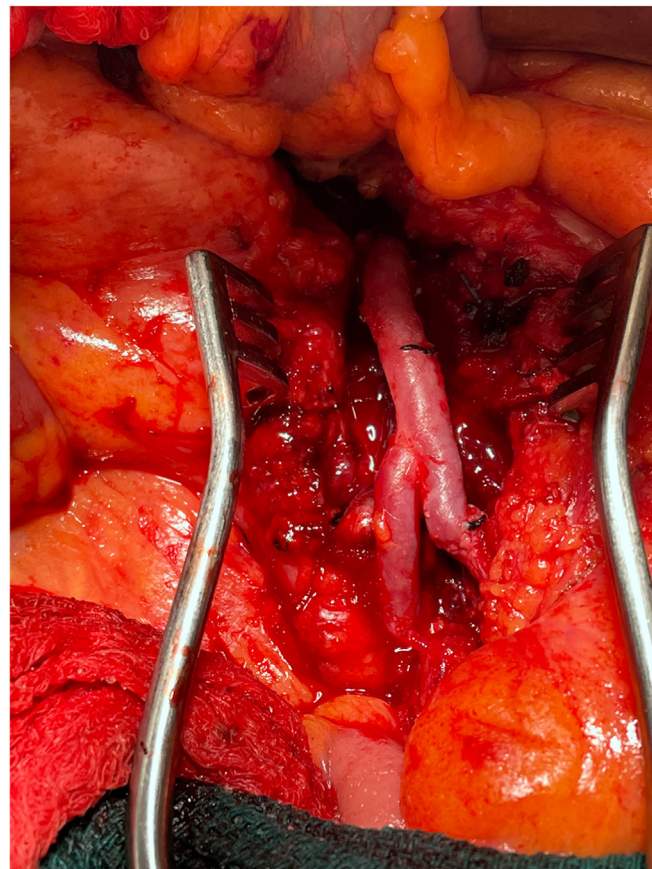
At 6 days postoperatively, the patient underwent video-assisted thoracoscopic surgery with decortication for a left lower lobe empyema. The patient recovered without complications and was discharged on hospital day 32 (day 17 after aneurysm repair). He was discharged with 2 g of IV ampicillin every 4 hours and 2 g of IV ceftriaxone every 12 hours for 6 weeks after initial negative blood cultures. The patient suffered mitral valve damage from the endocarditis, which was managed with mitral valve replacement 2 months after discharge. At outpatient follow-up 4 months after his initial presentation, a CTA revealed an open graft with patent vasculature, and the patient reported normal gastrointestinal function without ischemia symptoms.

in Fig 3. Surgery was subsequently offered because of the high rupture risk. Given the plan for SMA repair via laparotomy, the surgical team recommended concomitant splenectomy given the radiographic persistence of the splenic abscess and risk of treatment failure with percutaneous drainage alone. Thus, concurrent splenectomy was performed with aneurysmectomy.





**Fig 4.** Saphenous vein graft after resection.



**Fig 5.** Saphenous vein graft after reconstruction.

## DISCUSSION

Owing to the high mortality associated with visceral mycotic aneurysm rupture, it is imperative to recognize and treat this condition. In the present case, the index of suspicion for a visceral mycotic aneurysm was high because of the patient's risk factors and classic presentation in the setting of a chronic infection.<sup>12</sup> The initial evaluation with CT, CTA, and blood cultures and management with empiric bactericidal antibiotics corresponded with the recommended preliminary management for suspicion of a mycotic aneurysm.<sup>12</sup>

The current treatment options include medical management, endovascular repair, and laparotomy with aneurysmectomy, with or without vascular reconstruction. Medical management alone for mycotic aneurysms has a high in-hospital mortality rate (50%),<sup>13</sup> and current practice typically includes excision of the aneurysm. Endovascular repair is reserved primarily for select cases in which the patient is deemed a poor surgical candidate. Previous case studies of endovascular repair have reported successful results; however, evidence supporting this approach is limited.<sup>8,11</sup>

Several studies have reported successful visceral mycotic aneurysm treatment via aneurysmectomy with vessel stump closure without vascular reconstruction

(primary aneurysmectomy).<sup>9,10</sup> However, aneurysmectomy alone for mesenteric aneurysms is associated with bowel resection in 10% of cases,<sup>14</sup> which poses additional postoperative risks such as anastomotic leakage and stricture. Revascularization should be considered if the affected branches supply a significant portion of bowel. Although the merits of revascularization for mycotic SMA aneurysms are unknown, extrapolation from studies of infected aortic graft reconstruction suggest that inline reconstruction might have a mortality benefit compared with stump closure alone.<sup>8</sup> For the present patient, revascularization with bifurcated vein grafting was the surgical team's preferred approach owing to the extent of bowel perfused by the affected portion of the SMA and the location within the branching segment. Our literature review found no previous studies of this approach.

To the best of our knowledge, the present case is only the sixth documented case of a mesenteric mycotic aneurysm caused by an *Enterococcus* species.<sup>15-19</sup> Although the antibiotic selection could differ based on the species, the general management recommendations of antibiotics and surgery are relevant for mycotic aneurysms of all types.<sup>20</sup>

In the present report, we describe the deployment of aneurysmectomy with bifurcated saphenous vein

grafting and antibiotics. We found these were effective in the management of a mycotic SMA aneurysm caused by *E. faecalis*.

## CONCLUSIONS

Mycotic SMA aneurysms can be fatal without proper management. In most cases, the initial management should include empiric bactericidal antibiotics, followed by surgical intervention. In the present report, we illustrate surgical resection, followed by bifurcated saphenous vein grafting, as a viable method to treat mycotic SMA aneurysms within the branching segment.

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Submitted Jan 30, 2023; accepted May 26, 2023.