Two consecutive cases of mycotic aneurysms resulting from Whipple disease

Charles Antoine Menier, BS, Pascal Rheaume, MD, *and* Julien Bernatchez, MD, MMSc, *Quebec City, QC, Canada*

ABSTRACT

Whipple disease is a rare multisystemic infectious process caused by *Tropheryma whipplei.* Classical clinical manifestations include chronic diarrhea, malabsorption, weight loss, and arthralgias. Cases of endocarditis and isolated involvement of the central nervous system have also been reported. Isolated vascular complications are not common with this disease. Vascular manifestations are mainly described as systemic embolization from underlying endocarditis. We report two consecutive cases of mycotic pseudoaneurysms resulting from Whipple disease treated with successful vascular reconstruction using autologous vein grafting. (J Vasc Surg Cases Innov Tech 2023;9:101182.)

Keywords: Mycotic aneurysm; *Tropheryma whipplei*; Whipple disease

Whipple disease (WD) was first described by Dr George Whipple in 1907. However, the microorganism was not described until 1961.[1] The causative bacterium, *Tropheryma whipplei,* was eventually identified in 1991 using sequencing of the 16S ribosomal gene. Although asymptomatic human carriers exist, the infection process is still unclear. Studies have revealed that farmers and workers with frequent contact with sewage or wastewater are more prone to the disease.[2,3] Only a small percentage of carriers will develop this rare multiorgan disease, with a reported prevalence of 1 to 9.8/1,000,000 persons. They typically present with diarrhea, malabsorption, and polyarthralgia.[4,5] Previous reports showed a tendency for middle-age white men; however, recent data have revealed a similar incidence in men and women.[1,5] Host immune deficiency could be another predisposing factor to the disease.[6,7] The diagnosis of WD remains challenging because the organism does not grow on standard cultures. It requires histologic and molecular analyses, such as periodic acid-Schiff (PAS) staining and polymerase chain reaction (PCR) testing on affected explants.

We present two consecutive cases of WD presenting with symptomatic mycotic pseudoaneurysms to highlight the arduous diagnostic process and challenging surgical management. Both patients provided written informed consent for the report of their case details and imaging studies.

CASE REPORT

Patient 1. A previously healthy 66-year-old white man first sought medical attention for worsening postprandial abdominal pain and new-onset dyspnea. He reported neither malabsorption, arthropathy, nor neurologic symptoms. His cardiovascular history was unremarkable. The initial investigation revealed infectious endocarditis with severe aortic regurgitation but with a preserved ventricular ejection fraction. A 25-mm mobile vegetation was identified on the aortic valve. Blood cultures were negative. Antibiotics were empirically administered, and the patient was transferred to a tertiary cardiac surgery referral center. Preoperative investigations identified a 46-mm nonmycotic ascending aortic aneurysm and right coronary and left anterior descending artery occlusions. Computed tomography angiography (CTA) showed nonocclusive septic embolisms in the splenic artery, superior mesenteric artery (SMA), and celiac trunk. No cerebral embolization was identified. After multidisciplinary discussions, it was suggested the patient should undergo cardiac surgery first, considering the severe aortic regurgitation with the absence of mesenteric ischemia. The diagnosis remained uncertain despite consultation with infectious disease specialists. Suspicion of Q-fever remained owing to the underlying endocarditis and positive Q-fever antiphase II IgM.

The patient underwent bioprosthetic aortic valve replacement and ascending aorta replacement with a Hemashield graft (Maquet Cardiovascular LLC, Rastatt, Germany) and double coronary artery bypass grafting. The postoperative course was uneventful. *Tropheryma whipplei* culture was negative on valvular vegetations. Postoperative CTA showed mycotic pseudoaneurysms of the celiac trunk and a jejunal branch of the SMA. A positron emission tomography scan confirmed the pseudoaneurysms' infectious nature.

He was then transferred to our center on postoperative day 10 and underwent a repeat CTA, which showed a 21-mm × 19-mm

From the Division of Vascular Surgery, CHU de Quebec, Hopital St-Francois D'Assise.

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Correspondence: Julien Bernatchez, MD, MMSc, Division of Vascular Surgery, CHU de Quebec, Hopital St-Francois D'Assise, Universite Laval, 10 rue de l'Espinay, Quebec City, QC G1L 3L5, Canada (e-mail: julien.bernatchez.2@ulaval.ca).

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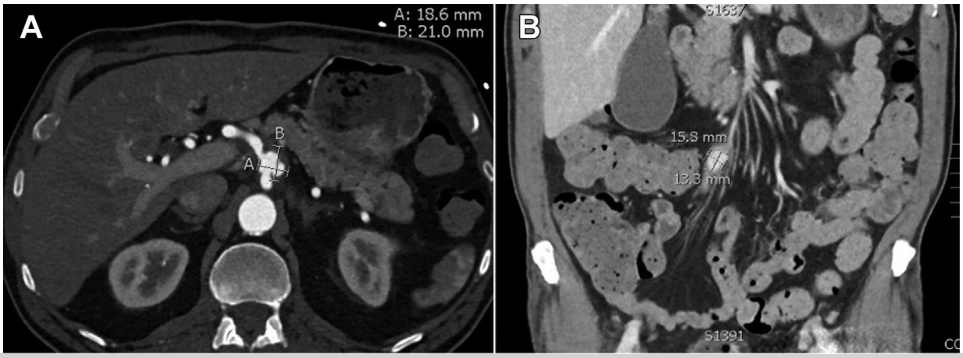

Fig 1. Patient 1. Computed tomography angiograms of the mycotic pseudoaneurysms. **A,** Mycotic pseudoaneurysm of the celiac trunk, axial view. **B,** Mycotic pseudoaneurysm of a jejunal branch of the superior mesenteric artery (SMA), coronal view.

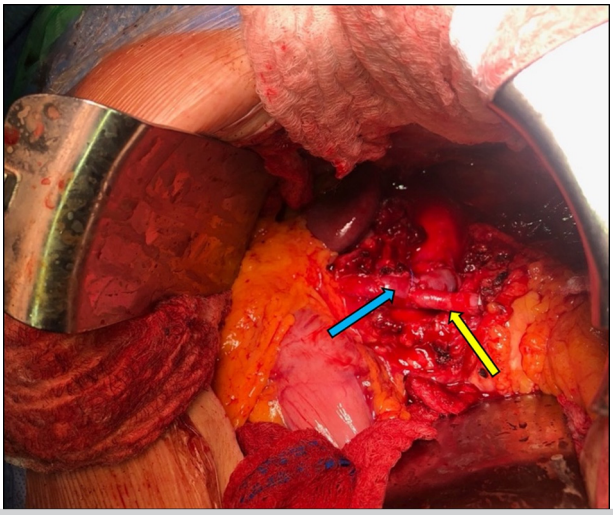

Fig 2. Patient 1. Celiac trunk reconstruction by aorto-hepatic bypass (*blue arrow*) using a vein graft and splenic artery reimplantation (*yellow arrow*).

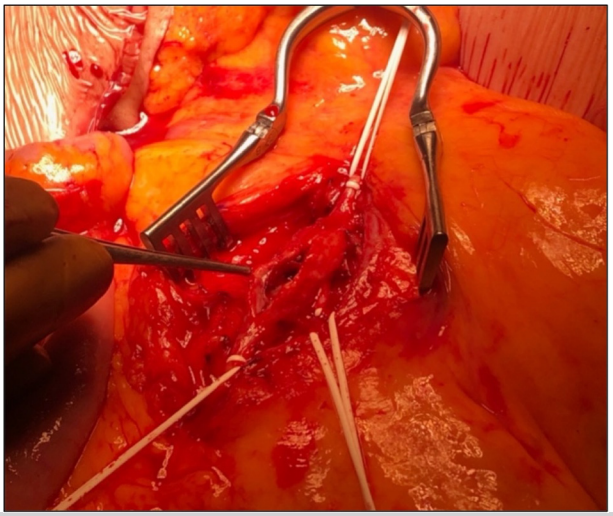

Fig 3. Patient 1. Jejunal branch pseudoaneurysm controlled and opened.

polylobed pseudoaneurysm of the celiac trunk (Fig 1, *A*) and a 15-mm × 13-mm pseudoaneurysm of a jejunal branch of the SMA (Fig 1, *B*). With the patient under general anesthesia, dissection of the celiac trunk by laparotomy was performed. In addition, the left femoral vein was harvested. Celiac trunk reconstruction was performed with aorto-hepatic bypass using the femoral vein, on which the splenic artery was reimplanted (Fig 2). The jejunal artery pseudoaneurysm was identified, ligated, and then resected (Fig 3). The affected artery was sampled and sent for pathologic examination; direct examination showed no bacteria. His postoperative course was uneventful, and he was discharged on postoperative day 10 with home intravenous antibiotic therapy (third-generation cephalosporin). The diagnosis remained uncertain because the cultures from the arterial sample were all negative. A few days later, the results from nuclear acid amplification test sequencing on intraoperative samples were positive for *Tropheryma whipplei*. The patient was contacted, and long-term antibiotic therapy was initiated (1 year of trimethoprim-sulfamethoxazole).

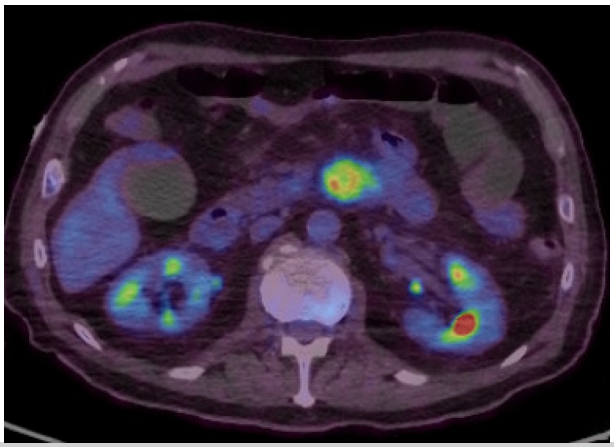

Fig 4. Patient 2. Positron emission tomography scan showing inflammation surrounding the superior mesenteric artery (SMA).

Patient 2. A 74-year-old white man presented with new-onset diarrhea and severe postprandial abdominal pain. He denied neurologic symptoms, arthropathy, or malabsorption

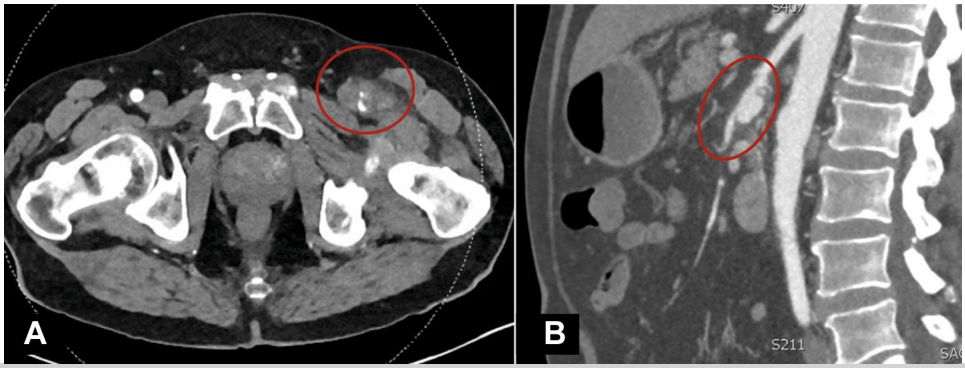

Fig 5. Patient 2. Computed tomography angiograms of the mycotic pseudoaneurysms. **A,** Inflammation and thrombus at the left femoral bifurcation, axial view. **B,** Superior mesenteric artery (SMA) pseudoaneurysm, sagittal view.

signs, other than diarrhea. His medical history consisted of dyslipidemia and past smoking. The initial blood test results showed signs of infection; however, the blood cultures were negative. CTA showed a subtotal thrombosis of the distal SMA with small bowel dilatation and adjacent fat stranding. Intravenous anticoagulant therapy and broad-spectrum antibiotics were initiated, and the patient was transferred to our center after 5 days of observation.

The initial differential diagnosis included arterial dissection, infectious arterial thrombosis, and vasculitis. The patient was maintained with nothing by mouth with intravenous nutrition because he could not tolerate enteral nutrition. A positron emission tomography scan was performed, which identified arterial and periarterial infiltration surrounding the SMA, suggesting an active inflammatory process (Fig 4). At 6 days after admission, he suddenly complained of left inguinal pain. Imaging revealed significant tissue infiltration surrounding the left common, superficial, and deep femoral arteries (Fig 5, *A*) and occlusion of the left popliteal artery due to suspected septic emboli.

The preoperative evaluation included transthoracic and transesophageal echocardiography. Both confirmed absence of intracardiac vegetation. The patient was taken to the operating room with curative and diagnostic intent. We performed femoral bifurcation reconstruction and popliteal bypass using a reversed ipsilateral greater saphenous vein. The popliteal occlusion segment was ligated and resected. Perioperative examination of the exposed native femoral arteries showed atypical inflammation of the arterial wall and surrounding tissues. Samples from the left femoral and popliteal arteries were sent for microbiologic and pathologic examination. His postoperative course was uneventful. Cultures of the surgical samples were negative; however, PCR analysis and nuclear acid amplification test sequencing were both positive for *Tropheryma whipplei* on postoperative day 8. His antibiotic therapy was adjusted accordingly.

He remained clinically stable, and the SMA aneurysm was closely monitored with imaging. Repeat CTA showed progression of the aneurysm's size, measuring 13 mm (Fig 5, *B*). We then agreed to surgically treat the remaining SMA aneurysm. The aneurysm was located and completely resected. Next, we performed mesenteric bypass starting at the SMA, distal to the middle colic artery, and ending on a healthy segment of the SMA using a reversed right saphenous vein. The postoperative course was favorable. Long-term follow-up by the vascular and infectious diseases teams was organized, and the patient was discharged with long-term antibiotic treatment (1 year of trimethoprim-sulfamethoxazole).

OUTCOME AND FOLLOW-UP

Both patients had a 6-week postoperative follow-up CTA. Neither patient presented with residual pain or physical limitation. CTA showed patent bypass at all surgical sites without signs of reinfection. Long-term follow-up will consist of CTA or duplex ultrasound every 6 months for the first 12 months and then yearly.

DISCUSSION

WD is a rare condition that can present as mycotic pseudoaneurysms of the visceral or peripheral arteries in absence of the typical symptoms of severe WD. The diagnosis requires PCR analysis or PAS staining on infected explants, because *Tropheryma whipplei* will not be detected through routine microbiologic culture.[1] These molecular methods offer greater specificity and sensibility than PAS staining.[8,9] Upper gastrointestinal endoscopy with duodenal biopsies is the gold standard for WD diagnosis.[10,11] We was expected to sample infected tissue during surgery; thus, neither patient underwent endoscopy. It is mandatory to evaluate for the presence of endocarditis with sensitive cardiac imaging, because distant pseudoaneurysms can potentially result from systemic embolization. Reconstruction of infected arteries should be performed using autologous conduits such as saphenous or femoral veins to avoid the risk of reinfection. Patients should be treated with an appropriate long-term antibiotic regimen.[12-14] We decided to treat both patients with trimethoprim-sulfamethoxazole consequentially to local antibiotic sensitivity.

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