The benefit of early repair for a mycotic aortic aneurysm due to *Yersinia enterocolitica* infection

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Mycotic aortic aneurysms are infrequent but challenging cases. We present a 68-year-old man with evolving infrarenal aortic and right common iliac artery aneurysms from an infection with *Yersinia enterocolitica*. This is a rare but virulent cause of aortitis. The patient underwent open resection and debridement with anatomic reconstruction using an aortic homograft. He recovered well and quickly returned to normal functional status. This represents the first successful anatomic aortic repair using homograft with this organism. Here, we review the literature and outcomes associated with this unusual pathogen. With favorable anatomy and expeditious operative management, good results can be obtained. (J Vasc Surg Cases 2015;1:61–4.)

The term mycotic aneurysm was first introduced by Sir William Osler in 1885 to describe secondary infections of the vascular system caused by bacterial endocarditis. In current usage, the term applies to any aneurysm of infectious origin. The etiology and pathogens have evolved over the years to include more aggressive organisms. For vascular surgeons, this disease process remains difficult to treat due to the fragile patient population and the complex repairs that are often required. Even with aggressive surgical care, the mortality remains high. The patient provided consent for the publication of his case report.

### CASE REPORT

The patient was a 68-year-old man with only a history of discoid (cutaneous) lupus erythematosus who emigrated from Eastern Europe 4 years earlier. He presented to another hospital with fevers to 103°F and significant back pain of 4 days’ duration. He denied any gastrointestinal symptoms.

Laboratory tests revealed leukocytosis of 16,000/mm³, and blood cultures grew gram-negative bacilli. A computed tomography (CT) scan with intravenous contrast demonstrated inflammation of the infrarenal aorta and a small aneurysm along the posterior wall with an aortic diameter of 2.8 cm (Fig 1). The patient was given intravenous piperacillin-tazobactam and transferred to our tertiary care institution.

On arrival, his fevers, leukocytosis, and bacteremia had resolved; however, he had persistent back pain. A CT angiogram performed 2 days after arrival demonstrated progression of his aortic disease, with interval enlargement of the initial posterior aneurysm to 3.0 cm and degeneration of previous areas of inflammation into new aneurysms (Fig 1). Final results of the blood cultures from the other hospital showed *Yersinia enterocolitica*. The patient was then taken for open operative repair.

Exploratory laparotomy revealed fibrosis in the terminal ileum, with normal appearance of the remaining small and large intestine, appendix, and gallbladder. Exploration of the retroperitoneum revealed a normal duodenum but significant inflammation of the infrarenal aorta. The infrarenal aorta and common iliac arteries were clamped after systemic heparinization, and the aorta was opened lengthwise. Two pockets of purulent material were evacuated, and a contained rupture of the posterior aortic wall was discovered at the site of the enlarging mycotic aneurysm (Fig 2). All clinically apparent infected and inflamed aortic and retroperitoneal tissues were debrided until only visually healthy tissue remained.

An anatomic reconstruction was performed (Fig 3) from the infrarenal aorta to the common iliac arteries using a cryopreserved cadaveric aortoiliac homograft (CryoLife Inc, Kennesaw, Ga). Two closed suction drains were left near the aorta. An omental pedicle was mobilized and used to cover the entire repair.

After the operation the patient fared well. Intraoperative cultures were positive for *Y enterocolitica*. Results of postoperative blood and urine cultures were negative. He was discharged to home on postoperative day 7. He was treated with 6 weeks of intravenous ceftriaxone and 2 weeks of oral metronidazole. The patient was seen in the clinic ~6 weeks after repair, with no complaints, and a subsequent CT scan did not demonstrate any evidence of residual or recurrent infection. The drains were removed, and he was prescribed a long-term oral suppressive regimen of trimethoprim and sulfamethoxazole.

### DISCUSSION

Mycotic aneurysms of the aorta represent an infrequent indication for aortoiliac reconstruction, with contemporary series having an incidence of 0.7% to 2.4% among all open thoracoabdominal or abdominal aortic repairs. Management of these patients is quite challenging because these often occur in patients who are immunocompromised or have other comorbid conditions (70%), involve segments other than the infrarenal aorta (60%-80%), and have...
a high incidence of rupture at the time of presentation (50%-85%). Most patients are symptomatic at presentation, although the nonspecific nature of the symptoms (fever, back pain) requires a high index of suspicion. These symptoms are often accompanied by other findings, including bacteremia, leukocytosis, elevated sedimentation rate, and occasionally, a pulsatile mass. CT findings include inflammation and aneurysmal changes of the aorta.

The organisms responsible for mycotic aneurysms have changed during the past century from gram-positive infections secondary to bacterial endocarditis to now predominantly *Staphylococcus aureus* and *Salmonella* spp. Infections with gram-negative bacilli appear to be particularly aggressive, with the risk of rupture >80% at 2 weeks from time of diagnosis. The bacteria isolated from our patient, *Y. enterocolitica*, is a rare cause of mycotic aortic aneurysm.

*Y. enterocolitica* is a gram-negative bacillus that, when infectious, typically causes gastrointestinal symptoms such as abdominal pain, emesis, and bloody diarrhea. There are two other pathogenic *Tersinia* spp: *Y. pseudotuberculosis* causes similar gastrointestinal symptoms, and *Y. pestis* is an agent responsible for the plague. *Y. enterocolitica* is not native to normal human flora but can be transmitted through contact with animals or ingestion of undercooked meat. It is an uncommon cause of illness in the United States, with cases more frequently reported worldwide. Why our patient did not present with recent gastrointestinal symptoms or how our patient acquired this infection is unclear, because he denied recent exposure to animals, ingestion of uncooked meat, or travel abroad.

Previous reports within the literature have described 12 primary or secondary cases of aortic infections due to *Y. enterocolitica*. The perioperative mortality in these cases was 66%. Mycotic aneurysms of other peripheral vascular territories, including the carotid and lower extremity, have been described with this organism and are equally rare.

Traditional teaching regarding repair of mycotic infrarenal aneurysms has included aneurysm resection, perivascular soft tissue debridement, oversewing of the infrarenal aortic stump, extra-anatomic reconstruction to avoid the infected field, and long-term antibiotic treatment. The advantage of this approach is that it can be performed in a staged fashion, and the bypass is performed outside of the infected field. Contamination in our patient was limited, and all visibly infected tissue was removed. A healthy cuff of infrarenal aorta and bilateral common iliac artery was obtained. In this setting, we prefer to use an anatomic...
reconstruction with an aortic homograft. This reduces operative time and eliminates the concern for rupture of the aortic stump seen with extra-anatomic repairs. The limitations of homograft include its expense and availability; although at our institution, we are fortunate to have a supply of grafts kept in frozen storage for such occasions. A recent multicenter series of aortic reconstruction using homograft for a variety of infectious conditions showed excellent long-term results.17 For mycotic aneurysms, other centers have also had good success in anatomic reconstructions using an antibiotic-soaked prosthetic graft2 or autologous deep femoral vein.18,19

Historically, mycotic aneurysms were thought to be a relatively fatal condition.20 Although the modern approach has significantly improved the mortality rate, it remains high, at 21% to 36%, within the perioperative period alone.2,3 A particular subset of patients does better with intervention. A recent review of our institutional data on small mycotic aneurysms (<4 cm aortic diameter) demonstrated a perioperative mortality of 0%, with a 90% survival at 23 months.1

Our patient was fortunate to have had small aneurysms in favorable locations. However, the radiographic progression of his aortic disease was quite concerning. In reviewing the cases of mycotic aneurysm associated with Y enterocolitica, many of the patients had large aneurysms with friable, poor-quality aortic tissue leading to massive hemorrhage at the time of repair.

CONCLUSIONS

We continue to advocate early surgical repair when a diagnosis of mycotic aneurysm is made, because progression of disease makes surgery increasingly complicated. In the setting of limited contamination, with adequate resection and debridement, an anatomic repair with aortic homograft can have good results.

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