

Use of an extracorporeal bypass for renal preservation to treat a rare case of a true mycotic aneurysm in a renal transplant patient

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True mycotic aneurysms of the abdominal aorta are extremely rare after organ transplantation. We report a renal transplant recipient who presented with *Pseudomonas aeruginosa* bacteremia and a new saccular infrarenal aortic aneurysm. A temporary extracorporeal axillofemoral bypass was placed to maintain perfusion to the transplant kidney. A contained rupture was found, and excision and in-line reconstruction were performed using a cryopreserved human aortic allograft. At 3 years, the patient remained well, with normal renal function while on oral antibiotic suppressive therapy. Use of an extracorporeal bypass was a viable technique with minimal morbidity for renal transplant preservation during open aortic replacement. (J Vasc Surg Cases 2015;1:148-50.)

True mycotic aneurysms of the abdominal aorta are extremely rare after solid organ transplantation. We present a renal transplant recipient who presented with *Pseudomonas aeruginosa* bacteremia and a new saccular mycotic aneurysm of the infrarenal aorta. Although multiple treatment options are available, the need for lifelong post-transplant immunosuppressive therapy had to be considered. Furthermore, the need to maintain perfusion to the transplant kidney and avoid warm ischemia during aortic cross-clamping presented an added challenge. We describe the use of a temporary extracorporeal bypass for renal preservation during aortic replacement with a cryopreserved aortic allograft. The patient consented for his case details to be presented for publication.

CASE REPORT

A 63-year-old man underwent an uncomplicated cadaveric renal transplantation 3 months prior. The kidney was placed in the right pelvis with end-to-side anastomoses to the external iliac artery and vein. He presented with fever, and his laboratory studies revealed leukopenia, neutropenia, and blood cultures positive for *P aeruginosa*. Treatment with intravenous piperacillin/tazobactam and vancomycin was initiated.

Computed tomography angiography demonstrated a new 4.3-cm saccular infrarenal aortic aneurysm that was not present

on aortic ultrasound imaging 1 year prior (Fig 1). The patient was diagnosed with a mycotic aneurysm of the infrarenal aorta. After a thorough discussion of the different treatment options, complete excision, wide débridement, and aortic replacement with a cryopreserved allograft was recommended, with a temporary extracorporeal bypass planned to preserve perfusion to the transplant kidney during aortic cross-clamping.

After the patient received systemic anticoagulation with intravenous heparin, an extracorporeal right axillary-to-right femoral bypass was created using a 6-mm polytetrafluoroethylene graft (W. L. Gore, Flagstaff, Ariz; Fig 2). An exploration of the abdomen demonstrated a significant amount of inflammation adjacent to the aneurysm. An infrarenal clamp was placed for proximal control. After the aneurysm sac was opened, distal control was obtained with balloon occlusion of the bilateral common iliac arteries. Adequate perfusion to the transplant kidney was confirmed with an intraoperative Doppler examination.

A contained posterior rupture of the aneurysm was identified. Because the rupture and the surrounding inflammatory tissue encompassed >50% of the aortic circumference, he underwent complete excision of the infrarenal aorta to avoid leaving behind infected tissue. Intraoperative Gram stains of the proximal and distal aortic margins were negative for microorganisms.

An in-line reconstruction was performed using a cryopreserved descending thoracic aortic allograft (Cryolife Inc, Atlanta, Ga) measuring 17 mm in diameter and 9 cm in length (Fig 3). Before abdominal closure, the omentum was placed around the aortic graft. The axillofemoral bypass was then completely removed, and the axillary and femoral arteriotomies were repaired with patch angioplasty with bovine pericardium.

The patient's postoperative care was remarkable only for the development of hemolytic anemia. This was felt to be drug-related and resolved with a change in his antibiotic regimen to meropenem. The patient was discharged without additional events on postoperative day 10. After 6 weeks of intravenous antibiotics, the patient was converted to a life-long oral suppressive regimen of amoxicillin/clavulanic acid and ciprofloxacin. On follow-up at 3 years, the patient remained well, with normal renal function and no recurrence of his symptoms. Computed tomography angiography demonstrated an intact aortic replacement without degeneration.

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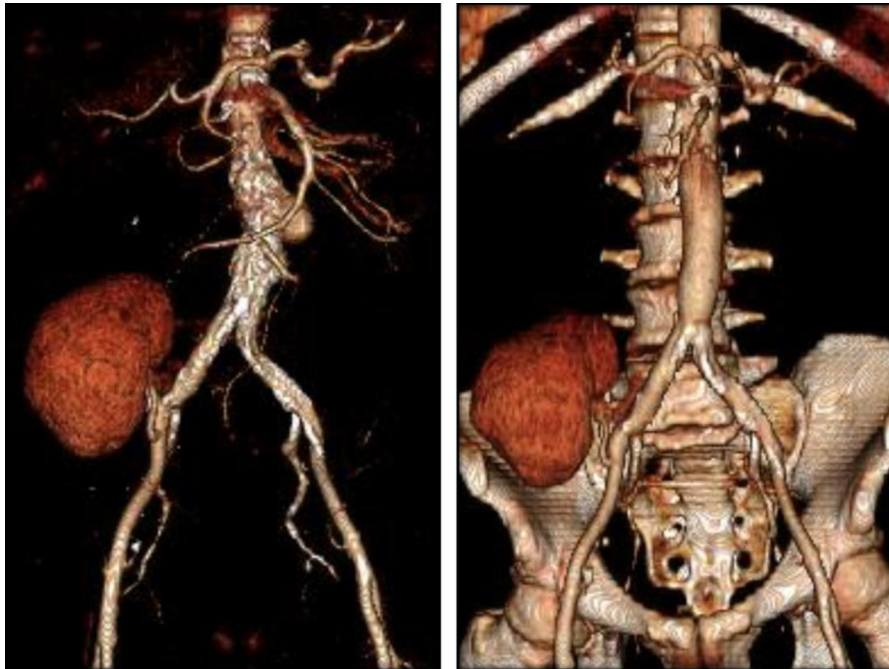


Fig 1. A three-dimensional computed tomography angiography reconstructions demonstrate a saccular infrarenal abdominal aortic aneurysm (**left**) before and (**right**) after complete excision of the infrarenal aorta and in-line reconstruction with cryopreserved human aortic allograft.

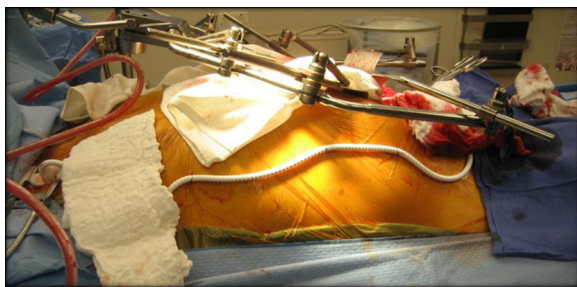


Fig 2. An intraoperative photograph demonstrates the temporary extracorporeal right axillofemoral bypass.

DISCUSSION

Mycotic aneurysms are rare, comprising ~1% of all aortic aneurysms.¹ Most commonly encountered pathogens include *Staphylococcus* and *Salmonella* spp, but infection with *P aeruginosa* has been reported in immunosuppressed patients after solid organ transplantation.^{2,3} Only two patients with a mycotic abdominal aortic aneurysm after renal transplantation have been reported, and both patients died of repeat rupture of their aorta after open repair.^{4,5} Multiple treatment options for mycotic aneurysms are available, but the optimal management remains unclear. The classic approach includes surgical resection and débridement, extra-anatomic revascularization, and appropriate antibiotic therapy.

However, an axillofemoral bypass is a less durable reconstruction, and there is a risk for aortic stump rupture and bypass graft infection.⁶ The use of cryopreserved allografts or antibiotic-soaked prosthetic grafts for an in situ reconstruction has demonstrated improved results.^{7,8} More recently, the use of aortic endografts has been reported, but the risk of persistent infection may limit its use as a temporary treatment measure.⁹

To determine the best treatment option for this patient, his need for life-long immunosuppressive therapy had to be considered. The gram-negative infection with *P aeruginosa* discouraged against the use of an endograft or prosthetic graft material due to the long-term infection risk. Given the lack of gross infection of the infrarenal aorta and the importance of maintaining long-term patency to his transplant kidney, we opted to perform an in-line reconstruction with a cryopreserved human aortic allograft. The use of cryopreserved allografts for aortic reconstruction has been shown to be associated with low rates of complications and advocated by some as a possible first-line treatment of aortic infection.¹⁰ In this case, the need to maintain perfusion to the transplant kidney during aortic cross-clamping presented an added challenge.

Abdominal aortic aneurysmectomy in a renal transplant patient without adjunctive measures has been described.¹¹ There are additional reports of the use of temporary shunts or a pump oxygenator to maintain kidney perfusion.^{12,13} The use of an extra-anatomic bypass to maintain transplant

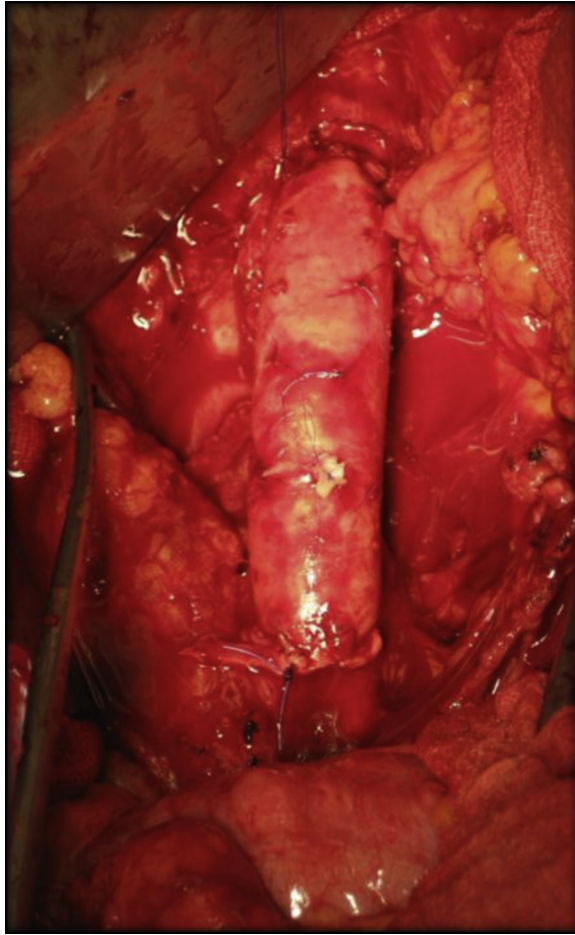


Fig 3. An intraoperative photograph demonstrates infrarenal aortic replacement with cryopreserved human aortic allograft.

renal perfusion had been described. Naresh et al¹⁴ performed an axillofemoral bypass to perfuse a transplant kidney but left the graft in place after in-line reconstruction of the aorta using an antibiotic-impregnated prosthetic graft. The patient subsequently developed an infection requiring removal of the graft. The use of a temporary extracorporeal bypass has also been described in other clinical situations. Constantinou et al¹⁵ described the use of a temporary axillobifemoral bypass graft for patients with lower limb arterial occlusive disease and difficult aneurysm anatomy undergoing fenestrated endovascular aortic aneurysm repair to decrease the risk of lower limb ischemia.

In this case, we decided to place an extracorporeal bypass graft from the right axillary artery to the right femoral artery to maintain flow to the right iliac system to perfuse his transplant kidney. This was placed before the laparotomy and allowed us time to meticulously explore the abdomen and widely débride the affected aortic segment. We ultimately decided to completely

remove the bypass graft to prevent future infectious complications.

CONCLUSIONS

We present a rare case of a true mycotic abdominal aortic aneurysm after renal transplantation. The patient was treated with complete excision of the infected segment and in-line reconstruction with a cryopreserved allograft. The use of an extracorporeal bypass in this case was a viable technique with minimal morbidity to allow renal transplant preservation and avoidance of warm ischemia during open aortic replacement with aortic cross-clamping.

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