Use of Parietal Peritoneum for Aortic Stump Coverage Following Removal of an Infected Aortic Prosthesis

A Case Report

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Aortic graft infections, albeit rare, pose a significant treatment challenge. Aortic stump disruption, in particular, is a potentially devastating complication. We describe a novel technique of using the parietal peritoneum to bolster a friable aortic stump in a 56-year-old man after an infected aortobifemoral graft was removed. The parietal peritoneal pedicle, in our experience, provides an effective alternative to reinforce an aortic stump when conventional coverage options have been exhausted.

Introduction

Though aortic graft infections are a rare complication of aortic reconstruction with a reported overall incidence of 0.5% to 6%, it is associated with a 33% to 75% mortality rate and 30% limb loss rate.1 One common dilemma among the different surgical treatment options is managing the friable aortic stump. We describe a surgical strategy of using the parietal peritoneum to reinforce the aortic stump after excising an infected aortobifemoral graft.

Case Report

A 56-year-old man with a past surgical history significant for an aortobifemoral bypass (AFB) with Dacron graft 4 years ago for aortoiliac occlusive disease presented with a 3-day history of nausea, vomiting, fevers, and chills. However, he denied any symptoms of abdominal pain, hematochezia, melena, and hematemesis. His past surgical history also included an exploratory laparotomy with lysis of adhesions for intestinal obstruction 3 months following the AFB and a right groin infection 3 years later, which was managed conservatively with antibiotics. Additionally, he had a
history of polysubstance drug abuse. On admission, the patient had a low-grade temperature with an otherwise unremarkable physical exam. A laboratory workup revealed leukocytosis (WBC 19,100) and positive blood cultures for *Klebsiella* sp. An abdominal computed tomography (CT) scan showed periaortic gas, suggestive of a graft infection (Figure 1).

The patient was started on broad-spectrum intravenous antibiotics, and the decision was made to perform a bilateral axillopopliteal bypass with 7 mm polytetrafluoroethylene (PTFE) grafts and to remove the infected prosthesis at the same operative setting. Intraoperatively, the graft was noted to have eroded into the third portion of the duodenum, resulting in an 8 x 5 cm duodenal defect while the graft was intact with bile staining on the anterior surface of the corresponding portion of the graft (Figure 2).

The duodenal defect was repaired with a duodenojunostomy and temporary pyloric exclusion. The infected graft was then carefully excised. The exposed aortic stump was oversewn, but could not be covered by use of conventional approaches owing to a lack of omentum and retroperitoneum in this particular patient. Hence, a pedicle flap of parietal peritoneum from the anterolateral abdominal wall was harvested and tunneled beneath the descending colon to buttress the aortic stump, which was next to the bowel anastomosis (Figure 3). Subsequently, bilateral sartorius flaps were used to protect the femoral stumps. The patient recovered well from the surgery after a prolonged hospital course.

**Discussion**

The optimal surgical management of an infected aortic prosthesis remains not only technically demanding but also highly debated. Total graft excision continues to be the mainstay of therapy, particularly in patients with overwhelming infection. However, the procedure leaves a friable aortic stump with the potential for acute disruption, which is uniformly fatal. Though the incidence of aortic stump blowout has been reported as low as 1.8%, careful management of the aortic stump is integral in the treatment of aortic graft infections. Our case introduces a novel strategy of utilizing the parietal peritoneum to reinforce the aortic stump when other conventional methods have been exhausted.

Surgical reconstruction of abdominal aneurysms and occlusive disease with prosthetic grafts has undergone significant changes since its first inception. However, despite advances in graft engineering, prophylactic antibiotics, and surgical field preparation, graft infection remains a potentially grave complication of the aortic surgery. Predisposing factors to graft infections have been speculated to correlate with whether the operation was emergent; whether there were postoperative wound-healing complications such as
lymphatic drainage, hematoma, or seroma; or whether the patient had comorbidities such as diabetes, immunosuppression, or malnutrition. Graft infections are thought to be a result of perioperative bacterial contamination at the time of implantation, systemic bacterial seeding, or local bacterial invasion, such as local infection or a graft-enteric fistula.

The surgical approach is tailored to the patient's anatomy, findings at presentation, and the surgeon's preference. Though the treatment of infected aortic grafts remains in dispute, abdominal aortic graft sepsis necessitates removal of the infected prosthesis with possible autogenous or extraanatomic revascularization. Different surgical strategies for revascularization include in situ reconstruction with an antibiotic-soaked graft, an allograft, superficial femoral veins, or an extraanatomic bypass. Hayes and colleagues reported good results with non-MRSA infected grafts using a rifampicin-bonded prosthesis. However, they had a perioperative mortality rate of 18.2% with significant graft-related complications of peritoneal candidiasis, transient renal impairment, and profound anorexia. Two of their patients died as a result of a recurrent graft infection within 30 months. Kieffer et al used aortic allografts as an in situ conduit with a reported perioperative mortality of 12% and a graft complication rate of 26%, which included septic rupture, thrombosis, and graft-enteric fistula. During their serial surveillance, it was found that 26% of their patients had radiologic evidence of pathologic changes in the allografts with 9% requiring repeat operations. Furthermore, Clagett and colleagues constructed a neoaortoiliac system using deep femoral veins to treat patients with infected aortic grafts. In their study, a perioperative mortality rate of 10% with an early amputation rate of 5% was observed. Though Clagett et al had a 5-year primary graft patency rate of 83% and a 5-year limb salvage rate of 86%, their mean operative time was 7.9 hours with major perioperative morbidity, which included compartment syndrome, venous thrombosis, and limb paralysis, occurring in 49% of their patients.

Conversely, in situ repair is generally hazardous when the graft is infected with virulent bacteria, when there is existing aggressive periaortic infection with gross purulence, and when the patient has a history of a prior graft infection. In these scenarios, total graft excision with an extraanatomic revascularization through a noninfected field is preferred. Our patient had extensive graft contamination due to erosion into an adjacent duodenum. Therefore, total graft excision and extraanatomic bypass were performed.

One common dilemma among all surgical options is the management of a friable aortic stump. Traditionally, double-row closure with monofilament polypropylene suture, remnant aneurysmal wall, an omental pedicle, or a retroperitoneal flap have been used to support the fragile aortic stump to decrease the risk of free rupture. When these options are not available, other techniques using monofilament sutures reinforced with autogenous vein pledgets, jejunal serosal pedicle flap, the anterior spinal ligament, or prevertebral fascia to cover the aortic stump have been described. Additionally, Sarac and colleagues recently reported good short-term results with the use of autogenous fascia-peritoneum as a pledget to close the aortic stump.

As for our patient, there was an insufficient amount of omentum and retroperitoneum to cover the aortic stump. In addition, the gross infection of the omentum and retroperitoneum made them intuitively unappealing; however, the parietal peritoneum underlying the anterolateral abdominal wall was easily accessible and available. Harvesting the parietal peritoneum did not significantly prolong our operative time, and we felt that preserving the blood supply would provide for a more durable bolster that would be resistant to breakdown from infection.
Though innovative ways have been explored to reinforce an aortic stump, little long-term data exist to support one approach. The incidence of aortic stump disruption is rare; however, it is such a devastating complication that it forces the vascular surgeon to give it serious thought in the operative planning. No prior reports have described using a parietal peritoneal pedicle to secure the stump, but in our opinion, this approach is a safe and easy option that has the potential to provide a strong and enduring closure of a weakened aortic stump. Hence, in certain settings, it may be useful to have this a part of a surgeon's armamentarium.

REFERENCES