

Left Ventricular Assist Device Salvage with Omental Flap

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Summary: A large number of people are affected with heart failure annually and require left ventricular assist device placement as a bridge to heart transplant or as destination therapy. When these devices become infected, it is a challenge to eradicate the infection. Failure ultimately results in a significant morbidity and mortality. Source control along with debridement and antibiotics can eradicate the infection of the patient, but many times there is a large defect that needs soft-tissue coverage. Many options for soft-tissue coverage have been suggested, but omentum may be an excellent choice due to its vascularity, bulk, and immunological properties. In this case report, the omental flap is employed for salvage of the left ventricular assist device with excellent results. (*Plast Reconstr Surg Glob Open* 2017;5:e1250; doi: 10.1097/GOX.0000000000001250; Published online 1 March 2017.)

Hart failure affects an estimated 5.1 million Americans, with 550,000 new cases diagnosed annually.¹ Patients with mild-to-moderate heart failure have been shown to benefit from drug therapy. Those with severe disease continue to have 1-year mortality rates exceeding 50%. Cardiac transplant remains the only treatment that has been shown to have long-term individual benefit. The paucity of viable donor organs remains a limiting factor for these patients. This had led to the research and development of the artificial heart program at the National Institute of Health and from this the popularization of use of left ventricular assist devices (LVADs). LVAD implantation has become an effective treatment option for patients with severe heart failure both as a short-term bridge to transplant and increasingly as a viable long-term option.² LVAD treatment continues to have infection as one of its most common complications.³ LVADs may be infected at the pump pocket, the driveline, or the device valve. Infections to the LVAD device are recalcitrant and similar to any other synthetic medical devices. *Staphylococcus aureus* is the most common organism found to cause infection

of the device and is associated with the development of biofilms.⁴ Biofilm development by the common pathogens presents a significant hurdle in the treatment of LVAD with antimicrobial therapy alone. Device exchange or removal is frequently required for eradication of infection, which may not be an option for the patient with severe heart failure.⁵ There is some literature suggesting that urgent cardiac transplantation be considered for patients with blood stream infections from infected LVADs.⁶ In patients undergoing destination therapy LVAD, this option is not available and hence places the patient with almost no viable alternative other than antibiotics. Antibiotics with time become ineffective due to development of resistance.

There are case reports in the literature describing salvage of LVADs with debridement, antibiotic beads, and vascularized flap coverage.⁷ Flap coverage of the LVAD is similar to any mediastinal wounds but requires not only coverage of the sternum but also encasement of the device with vascularized tissue. Common flaps that have previously been employed are the rectus abdominis myocutaneous/muscle flap, pectoralis major flap, chest wall perforator flap, intercostal perforator flap, and the omental flap.^{7,8} None of these techniques have been used in large numbers or found to be the superior “lifeboat,” but it has been suggested that the immunological properties of the omentum, specifically the omentum-associated lymphoid tissue, may play a role in antibacterial defense.^{9,10} The increased immunological properties along with its physical properties of size and robust vasculature may make it the more superior option when choosing a flap for reconstruction.¹⁰ We present a favorable case report

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Received for publication December 5, 2016; accepted January 10, 2017.

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DOI: 10.1097/GOX.0000000000001250

Disclosure: Dr. Bansal is a consultant at St Judes and Abiomed. He received research grant from St Judes and Abiomed, and he is a member of the Surgical Advisory Board of Abiomed. The other authors have no financial information to disclose. The Article Processing Charge was paid for by the authors.

in which the intrathoracic and preperitoneal portion of the device was salvaged using a pedicled omental flap in combination with pectoralis major flap.

CASE PRESENTATION

This is a 49-year-old male with history of ischemic cardiomyopathy with severe coronary artery disease and decompensated heart failure. He sustained multiple myocardial infarctions and revascularization procedures. Subsequently, he developed decompensated heart failure requiring HeartMate II LVAD by Thoratec Corporation placement as destination therapy. The device was placed in the preperitoneal space with the drive line tunneled through the subcutaneous tissue and exiting to the right of the umbilicus at the midclavicular line.

His course was complicated by upper gastrointestinal tract bleeding for which he had multiple admissions and endoscopies. He was transfused in excess of 10 units of packed red blood cells but fortunately never required surgery from bleeding. During one of these admissions for anemia, he developed signs and symptoms of sepsis. Work up revealed methicillin-resistant *S. aureus* bacteremia. A computerized tomography scan was obtained to investigate a source. Computerized tomography scan demonstrated large fluid collection with air around the LVAD device and exit graft. Multiple trips to the operating room for irrigation and debridement of the soft tissue and sternum occurred, which allowed for source control. Plastic surgery was consulted to assist with coverage of the LVAD hardware and sternal closure. He underwent open harvest of the omental flap that was wrapped around the LVAD device and drive line with a unilateral nondominant pedicled pectoralis major flap for sternal coverage. The skin was closely approximated over the muscle flap allowing a less than 2-cm gap between the edges of the skin to heal by secondary intention due to the chronic nature of this infection. Rifampin and vancomycin were planned to be continued for 6 weeks by a peripherally inserted central catheter followed by minocyclin for lifelong suppression. The mediastinal skin wound granulated and healed with no issues. The patient has not had any recurrences of infection at 3 months out from coverage.

DISCUSSION

LVAD use has become much more widespread both for bridge and as a destination therapy. One of the most common and potentially fatal complications of these devices is infections. Treatment of this complication requires a multidisciplinary team of physicians who are well versed in treating severe heart failure patients. The basic principles of surgery still ring true: source control,

debridement of devitalized tissue, and directed antibiotic coverage. Coverage of the exposed device is always a difficult problem. There are many established options for sternal wound coverage that have been described. In this case report, we have shown surrounding the device with well-vascularized, bulky, lymphatic rich tissue can provide a good option for coverage and has the benefits of assisting with infection control.⁹ These patients require careful thought and evaluation when planning soft-tissue coverage. A one-size-fits-all operation for this complex problem is not reasonable, but we have shown here that omental flaps can be good options for coverage due to its pliable nature combined with the rich vasculature and immunological properties.

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