Asian Journal of Surgery (2017) 40, 232–235

Available online at www.sciencedirect.com

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journal homepage: www.e-asianjournalsurgery.com

CASE REPORT

Colo-colonic anastomosis in a continuous-flow left ventricular assist device patient

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Received 25 September 2013; accepted 29 January 2015
Available online 13 March 2015

KEYWORDS
anastomosis;
heart failure;
ventricular assist device;
wound healing

Summary Noncardiac operations are being increasingly performed on patients with left ventricular assist devices (LVADs). However, little is known on the impact of continuous-flow LVADs on the vascular supply of the colon for anastomoses. In this case, a 67-year-old male supported on an LVAD underwent four successful noncardiac operations including two intestinal anastomoses; left colon and small bowel anastomosis. To the best of our knowledge, no existing literature has reported successful colonic anastomosis on a continuous-flow LVAD. This case illustrates the plausibility of performing colonic anastomoses with appropriately selected patients supported on an LVAD. A 67-year-old male with congestive heart failure underwent LVAD placement for decompensated heart failure while awaiting orthotopic transplantation. During his recovery, he developed a stage IV sacral decubitus ulcer which required a sigmoid loop colostomy placement and a rotational flap. Subsequent stoma closure with partial sigmoid colectomy and stapled anastomosis was performed, and healed without evidence of anastomotic leak. This case illustrates the potential for colonic anastomoses for patients on continuous-flow LVAD support. Although oxygenation is known to be an important aspect of healing, this patient's outcome suggests that intestinal anastomoses can be performed on the induced pulseless environment of an LVAD. Further studies will be needed to further elucidate the success of longer segment resections and appropriate surgical candidates.

Conflicts of interest: All contributing authors declare no conflicts of interest.

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http://dx.doi.org/10.1016/j.asjsur.2015.01.003

1. Introduction

In the current armamentarium of advanced congestive heart failure, left ventricular assist devices (LVADs) are frequently used. Refinements in technology have allowed these devices to be used both as a bridge to orthotopic heart transplantation, as well as destination therapy.[1] The devices have also recently been updated from pulsatile—flow devices to continuous—flow devices using centrifugal pumps, which have allowed them to become smaller and suitable for use outside of the inpatient environment. The development of continuous-flow devices improves their mechanical durability and functionality greatly, but differs from normal physiology; startlingly, many of these patients do not have a pulse. Currently, there are several small series of noncardiac operations and procedures on patients supported on LVADs, including a right hemicolectomy,[2] but little is currently known about the healing of colonic and intestinal anastomoses, especially with continuous-flow LVADs. At our academic medical center, a single patient successfully underwent four major noncardiac operations while supported on a continuous-flow LVAD, two of which included intestinal anastomosis. The first anastomosis occurred during a loop sigmoid colostomy closure. This procedure was complicated by a small bowel obstruction requiring a second operation, and small bowel resection with enteroenterostomy. Both anastomoses healed without evidence of anastomotic leak, despite surgical concerns regarding intestinal perfusion with a continuous-flow LVAD.

2. Case report

The patient is a 67-year-old male with a past medical history of decompensated systolic congestive heart failure, New York Heart Association Stage IV, with complications of ventricular tachycardia. Due to decompensated heart failure progressing to acute renal failure on continuous veno—venous hemodialysis, a continuous-flow HeartMate II LVAD (Thoratec Corporation, Pleasonton, CA) was placed as a bridge to transplantation. During the patient's prolonged postoperative course, he developed a Stage IV right sacral decubitus ulcer which precluded his placement on the orthotopic heart transplantation listing. After extensive multidisciplinary discussions with the transplantation committee, the patient was offered operative treatment in the hopes of qualifying for transplant relisting (Table 1).

The patient underwent a laparotomy and loop sigmoid colostomy placement 38 days after his LVAD placement. Cardiac anesthesia specialists were used. Estimated blood loss was minimal at 20 mL. Perioperative anticoagulation was managed by discontinuation of an oral vitamin K antagonist and transition to a heparin continuous infusion which was held 8 hours before surgery and 24 hours afterwards. Eight days later, plastic and reconstructive surgery performed a right superior gluteal artery perforator myocutaneous rotational flap for soft-tissue coverage of the right sacral decubitus ulcer. The patient recovered uneventfully and was discharged to a rehabilitation facility several weeks later.

Six months later, the patient was reevaluated for sigmoid loop colostomy closure. This operation was considered high risk for morbidity and mortality, secondary to the concern for anastomotic complications. Given the unknown reliability of the left colonic vascular supply on a continuous forward-flow LVAD, the likelihood of an anastomotic leak was of specific concern. After an extensive discussion, the multidisciplinary transplant committee advocated colostomy reversal to minimize infectious concerns in support of orthotopic heart transplantation listing. The patient underwent a sigmoid loop colostomy closure locally through his ostomy site with a stapled side-to-side, functional end-to-end anastomosis on post-LVAD Day 219. A 100 mm blue-load linear GIA cutting stapler (Ethicon Endo-Surgery Inc., Blue Ash, OH) was used in two fires — one to create an anastomosis between the two limbs of bowel and the other as a transverse fire to close the enterotomies and resect the specimen. Again, cardiac anesthesiologists provided anesthesia services. Blood loss was 50 mL. Perioperative anticoagulation management involved transition to a continuous heparin infusion which was held 8 hours before and 24 hours following the operation. The patient had return of bowel function on postoperative Day 3 and was subsequently discharged to a rehabilitation facility on postoperative Day 5.

Fifteen days later, he represented with nausea, vomiting and was diagnosed with a high-grade small bowel obstruction (Fig. 1). He underwent a laparotomy with lysis of adhesions and small bowel resection and anastomosis for an adhesion of the bowel to the anterior abdominal wall creating a nonviable segment of small intestine. A two-

Table 1 Operative details.

Operation	Days after LVAD	Estimated blood loss	Blood transfusions	Anticoagulation management
Loop sigmoid colostomy	38	50	3 units packed red blood cells (pRBCs) intraoperatively, 2 pRBCs postoperatively	Hold heparin infusion
Right gluteal rotational flap	46	100	5 units pRBCs postoperatively	Hold heparin infusion
Colostomy reversal	219	20	None	Hold heparin infusion
Laparotomy, lysis of adhesions	234	100	None	Prothrombin complex concentrate, vitamin K