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Left Ventricular Assistant Device in End Stage Heart Failure as A Step of Heart Transplantation Center: A Case Report

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ABSTRACT

With increasing prevalence of patients with advanced heart failure (AHF), increasing amount of readmission frequencies, duration of maximum medical therapy, and the 50% mortality during one-year, Left ventricular assist devices (LVAD) are considered to be an acceptable treatment option in these cases. Advanced newer-generation of LVAD devices improves outcomes, and deceases morbidity . LVAD is considered as a bridging therapy in cases of decompensated HF which are scheduled for heart transplantation (HTx), or as destination therapy (DT) for cases either elder or with severe comorbid condition . LVAD is mechanical device that assists the pumping function of left ventricle (LV) by diverting blood into an external circulatory circuit connecting to the aorta. LVAD usually consists of (A) pump implanted to LV, (B) percutaneous driveline, and (C) externally controller and batteries .

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Introduction

The Worldwide prevalence of advanced heart failure (HF) is estimated at 65 million patients and is expected to increase (1). Decompensated HF is a major cause of morbidity and mortality. In patients with Advanced decompensated HF, heart transplantation (HTx) remains the definitive therapy and can significantly improve survival and quality of life (2). Increasing number of patients awaiting HTx is more obvious within the last years, however, available donor organs dropped by a third (3). So, Left ventricular assist devices (LVAD) have become a viable alternative (4). LVAD is a safe and efficacious treatment strategy for patients with end-stage HF that is refractory to medical treatment (5). However, there are post LVAD implantation complications such as bleeding, infection, thrombosis, hemodynamic alternations and device malfunction (6).

Case Description

A 34 year-old gentleman suffered from idiopathic dilated cardiomyopathy with refractory end stage decompensated HF, and another case 29 years-old female with postpartum cardiomyopathy with EF 15% were planned for LVAD implantation. They

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had received maximum medical therapy. They had a history of repeated cardiac care unit (CCU) admissions, and inotropic support. Discussion with his family for LVAD implantation and informed consents were signed. Female patient had permanent pacemaker due to heart block (Figure 1). The procedure was performed via standard sternotomy on CPB without cross clamp. The surgeon docked the inflow cannula on the left ventricle (LV) apex (Figure 2); made a tunnel for the driveline (Figure 3), and anastomosed the outflow graft and aorta. After bleeding control with de-airing, the patient was weaned from CPB by carefully increasing the LVAD speed. Mean arterial blood pressure was maintained at 70–80 mmHg using dobutamine (3 µcg/kg/min), norepinephrine (0.1 mcg/kg/ min) and milrinone (0.7 µcg/kg/min) during post-CPB period. HeartMate 3 LVAD (St Jude Medical Inc., St Paul, MN) was implanted.

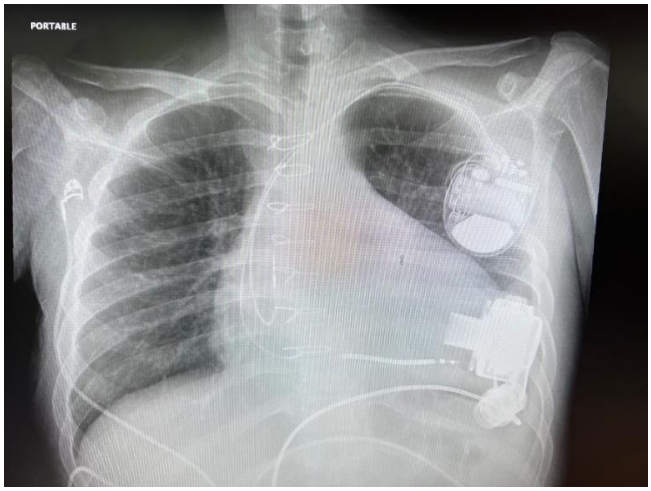

Figure 1. Chest X-ray post LVAD insertion with s/p ppm.

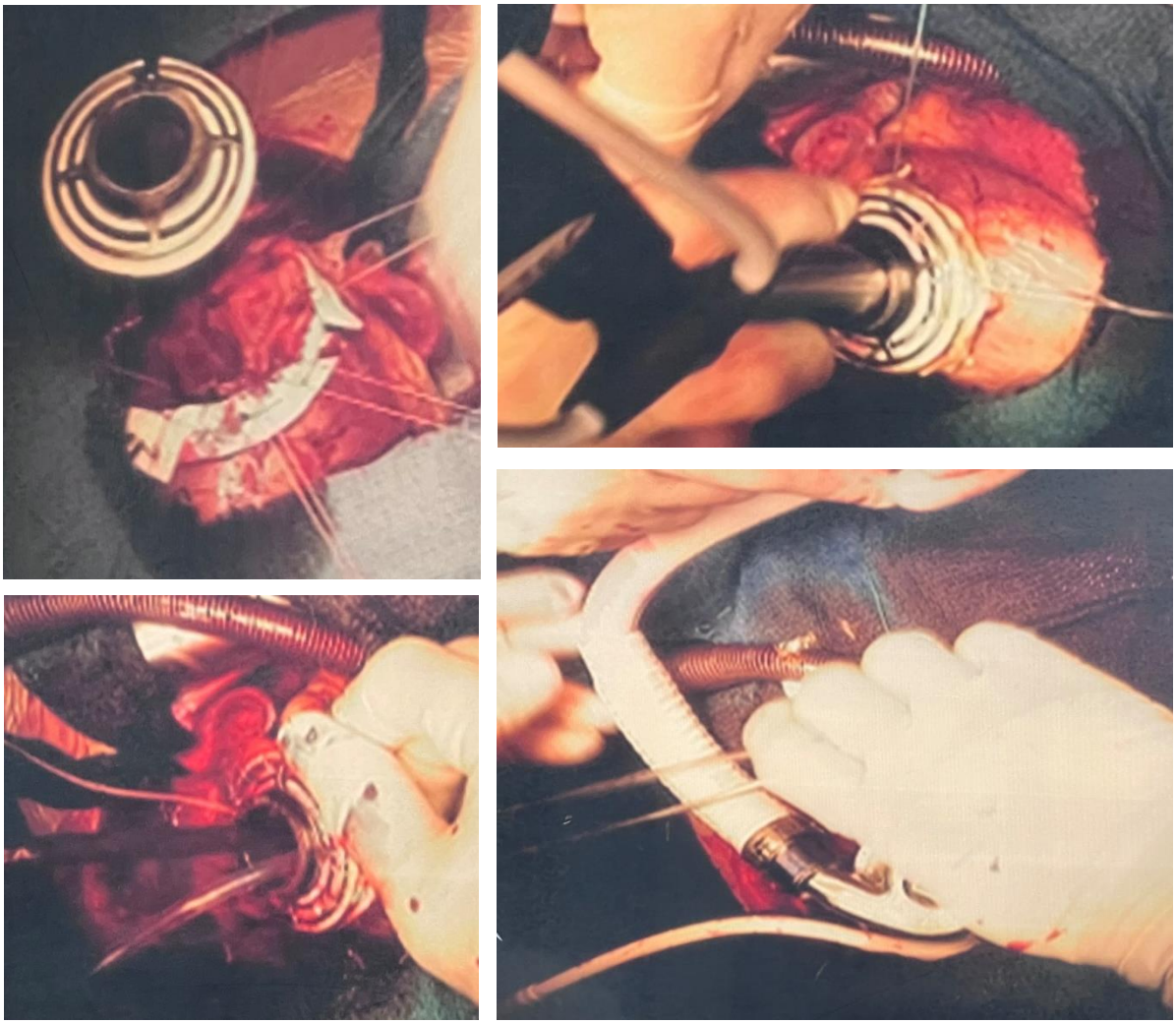

Figure 2. Steps of inflow insertion.

Figure 3. Driveline before subcutaneous insertion.

Inotropic supports weaned gradually. Follow up by heart failure team and intensivists were done to adjust flow of LVAD, echography, investigations, and radiological imaging. The LVAD pump speed was maintained at 5000 revolutions per minute and pump flow at 2.5–3 L/min (Figure 4). Female patient came out from operative room open chest due to bleed and was closed 3rd postoperative day. The patient was transferred to floor postoperatively until discharge home. Intense rehabilitation postoperatively, anticoagulation, and adjust medications under supervision of heart failure team was planned.

Discussion

One of the leading causes of death in the developed world is advanced decompensated HF. In end stage decompensated HF, HTx is recommended after failure of medical therapy. Moreover, the importance of LVAD as destination therapy (DT) grows continuously due to a shortage of donor's hearts. Despite its spread, the implantation of LVAD still represents a high-risk procedure, which is related to severe adverse events, such as right ventricular failure (RVF), cerebrovascular accident (CVA), infection, pump thrombosis and hemolysis (7).

RVF remains a major complication after LVAD implantation which may significantly worse outcome. It may be unresponsive to medical therapy and require temporary RV assist device (RVAD) (8). Surgical bleeding is a common complication of LVAD implantation, its incidence is high as 60%; and surgical intervention may be required (9). Nowadays, technical improvements in LVAD equipment technology, surgical implantation techniques, and patients' care have reduced complications and improved the outcome (10). Our team consisted of cardiac surgeons, heart failure team, technicians, intensivists, and all staff members. we successfully implanted LVAD in two cases with complete care without complications, which lead to an improved quality of life in those patients.

Conclusion

Left Ventricular Assist Device implantation in the end stage heart failure is safe and continuously increasing and we successfully performed it as a bridge therapy with excellent outcome until build up heart transplant facility.

Abbreviations

LVAD : Left Ventricular Assist Device ; **CCU:** Cardiac Care Unit ; **EF :** Ejection Fraction ; **CPB :** Cardiopulmonary Bypass ; **DT:** Destination Therapy ; **LV:** Left Ventricle ; **HTx :** heart transplantation ; **RVF :** Right ventricular failure ; **RVAD :** Right ventricular assist device ; **CVA :** cerebrovascular accident.

Figure 4. Speed and flow of LVAD.

References

1. Ma WW, Suhitharan T, Shah SS, Kothandan H. Anesthesia for left ventricular assisted device insertion in a patient with multiple organ failure. Saudi Journal of Anaesthesia. 2021 Apr;15(2):210.
2. Han JJ, Acker MA, Atluri P. Left ventricular assist devices: synergistic model between technology and medicine. Circulation. 2018 Dec 11;138(24):2841-51.
3. Chair SY, Doris SF, Ng MT, Wang Q, Cheng HY, Wong EM, et al. Evolvement of left ventricular assist device: the implications on heart failure management. Journal of Geriatric Cardiology: JGC. 2016 Jul;13(5):425.
4. McNamara N, Narroway H, Williams M, Brookes J, Farag J, Cistulli D, et al. Contemporary outcomes of continuous-flow left ventricular assist devices—A systematic review. Annals of cardiothoracic surgery. 2021 Mar;10(2):186.
5. Han JJ, Acker MA, Atluri P. Left ventricular assist devices: synergistic model between technology and medicine. Circulation. 2018 Dec 11;138(24):2841-51.
6. Zijderhand CF, Knol WG, Budde RP, van der Heiden CW, Veen KM, Sjatskig J, et al. Relapsing low-flow alarms due to suboptimal alignment of the left ventricular assist device inflow cannula. European Journal of Cardio-Thoracic Surgery. 2022 Oct;62(4):ezac415.
7. Zhigalov K, Mashhour A, Szczechowicz M, Mkalaluh S, Baranov A, Easo J, et al. Long-Term Left Ventricular Assist Device (LVAD): A Rare Case of 10 Years' Support and Follow-Up. The American Journal of Case Reports. 2019;20:1035.
8. Coco VL, De Piero ME, Massimi G, Chiarini G, Raffa GM, Kowalewski M, et al. Right ventricular failure after left ventricular assist device implantation: a review of the literature. Journal of Thoracic Disease. 2021 Feb;13(2):1256.
9. Etheridge JC, Cousins RS, Philpott JM. Massive intercostal hemorrhage after implantation of an intrapericardial ventricular assist device: A case report. Journal of Cardiac Surgery. 2021 Jan;36(1):381-3.
10. Huenges K, Panholzer B, Cremer J, Haneya A. Left ventricular assist device implantation with concomitant aortic valve and ascending aortic replacement. Case Reports in Medicine. 2018 Jan 9;2018.