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Commentary: Arrhythmia surgery at the time of left ventricular assist device implant—use of caution

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CENTRAL MESSAGE

Necessity and efficacy of arrhythmia surgery at the time of LVAD implant need to be further investigated with its risk and benefit. An aggressive approach can alleviate postoperative arrhythmia.

Control of arrhythmia is necessary for the success of left ventricular assist device (LVAD) support to achieve adequate flow and avoid the use of right ventricular assist device (RVAD).[1] When faced with a patient with severe heart failure and refractory ventricular arrhythmias despite aggressive medical treatment and/or catheter ablation, surgeons are forced to decide what to do with arrhythmia at the time of LVAD implant. Three options are considered: (1) LVAD implantation alone, with a hope that arrhythmia burden subsides as the ventricle is unloaded; (2) implantation of biventricular assist device or total artificial heart; or (3) LVAD implant with arrhythmia surgery.

Orozco-Hernandez and colleagues[2] report a successful cryoablation during HeartMate 3 (Abbott, Abbott Park, Ill) LVAD implantation, with resultant decrease of ventricular arrhythmia (VT) and successful VAD support after temporary RVAD support. Although there is no previous report of arrhythmia surgery in HeartMate 3 implant, arrhythmia surgery at the time of other types of LVAD implant has been reported previously with controversial success. This report highlights 3 key questions, which are very important for clinicians.

The first question concerns the necessity and efficacy of the cryoablation as concomitant surgery for LVAD implant. According to this case report, after initial intraaortic balloon pump and antiarrhythmic drugs, VT burden decreased, and end-organ function recovered. This suggests that decrease of wall stress (ie, left ventricular end-diastolic pressure) was at least partially responsible for decreased VT burden. Further decrease of wall stress by LVAD implant could have mitigated VT, and may have been sufficient, although we will never know for sure.

The second question is the additional procedural complexity of ablation. Cardiac arrest was obtained to perform deliberate and thorough cryoablation with the best possible visualization in this case. Considering that the patient needed temporary RVAD support after surgery, it is possible that cardiac arrest could have exacerbated right ventricular (RV) dysfunction, and moreover, the possibility that cryoablation in the septum per se caused RV dysfunction cannot be ignored.

The third question is the necessity of intraoperative mapping and the method of ablation. The foci of VT can be endocardial or epicardial. One advantage of surgical ablation is that epicardial ablation can be safely performed under the direct vision. The authors performed a thorough ablation, based on anatomy and achieved arrhythmia control; however, some ablation might have been spared with electrophysiologic mapping, and perhaps, less ablation on the septum might have caused less RV dysfunction.

Considering the frequency of VT in the preoperative period and its effect on morbidity and mortality, the problem of VT management in LVAD is a very important one to be solved. For a patient who receives LVAD as a bridge

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to transplant, the new adult United Network for Organ Sharing heart transplant allocation system, effective in 2018, allows for prioritization in the setting of frequent VT.[3] One strategy is to keep these patients prioritized and perform heart transplantation as soon as possible. However, for the destination therapy patient, control of arrhythmia is critical for clinical success. Further investigation and more experience are needed in this area.

References

1. Ahmed A, Amin M, Boilson BA, Kiilu AM, Madhavan M. Ventricular arrhythmias in patients with left ventricular asset device (LVAD). *Curr Treat Options Cardiovasc Med*. 2019;21:75.
2. Orozco-Hernandez EJ, Argueta-Sosa EE, Joly JM, Pamboukian SV, Tallaj JA, Hoopes CW. Cryoablation during left ventricular assist device implantation: a case report. *Ignoramus et ignorabimus, sapere aude*. *J Thorac Cardiovasc Surg Tech*. 2020;1:55-7.
3. Rao P, Smith R, Khalpey Z. Potential impact of the proposed revised UNOS thoracic organ allocation system. *Semin Thorac Surg*. 2018;30:129-33.