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Research Letter

Telehealth for the Management of Left Ventricular Assist Device Patients: The University of Rochester TeleLVAD Study

To the Editor:

Telehealth visits for cardiac conditions, including heart failure, are increasing.[1,2] However, comprehensive remote evaluation of patients with a left ventricular assist device (LVAD) poses a challenge because specialized equipment is required, including a physical connection to a LVAD monitor to perform a complete interrogation and change LVAD speed and Doppler ultrasound for blood pressure measurement.[3,4] To our knowledge, the use of videoconferencing visits for comprehensive management of LVAD patients aimed to replace in-person visits has not been previously studied.

Currently, 238 patients who underwent LVAD implantation at the University of Rochester (UR) and live a mean of 62 ± 46 miles (range 1−264) from UR are managed as outpatients. During the first year after index discharge, clinic use is high and patients return to UR VAD Clinic a mean of 7 times for routine visits and 2 times for urgent visits.

Before the novel coronavirus disease-2019 pandemic, we conducted a prospective single-center observational study (TeleLVAD Study) to evaluate the feasibility and safety of comprehensive videoconferencing visits vs. conventional in-person VAD clinic visits among patients residing in a remote location. We hypothesized that videoconferencing visits are a safe alternative to in-person visits and improve health care use and quality of life.

Methods

Patients supported by a LVAD for 1 or more months, regardless of baseline risk factors, participated in this study from January 2019 to December 2019. Patients were scheduled for one videoconferencing visit at a remote site for routine follow-up and outcomes were compared with the subsequent in-person visit at UR after 2−4 months. Outcome measures included (1) technical feasibility and ability to complete a comprehensive examination and reach management decisions, (2) adverse events within 4 weeks of the visit, and (3) patient perceptions evaluated by the validated Telehealth Usability Questionnaire. The study was approved by the institutional review board and all patients provided informed consent.

During the videoconferencing visits, a LVAD cardiologist was present at UR and a general medicine nurse was present at a remote local clinic with the patient. Equipment present at the remote site included telemedicine cart, blood pressure cuff, Doppler ultrasound machine, LVAD monitor, and electronic stethoscope. Both videoconferencing and in-person visits included the following components: blood pressure measurement; auscultation of the heart, LVAD, and lungs; visual assessment of jugular venous pulsation and edema; driveline inspection and dressing change; and LVAD interrogation with LVAD monitor. LVAD speed changes were made based on a protocol integrating patient symptoms, LVAD interrogation results, and findings from most recent echocardiogram performed within the last 6 months.

Results

Eleven patients completed videoconferencing visits at 2 remote sites located 40 and 90 miles from UR. Patients (age 59 ± 11 years, 91% male, 36% destination therapy) were supported by a HeartMate II ($n = 4$) or HeartMate 3 ($n = 7$) (Abbott, Abbott Park, IL) LVAD for a mean of 17 months (range 3−58) and lived 31.3 ± 17.3 miles from the remote sites. History of LVAD-related complications at enrollment included rehospitalization ($n = 7$), ventricular tachycardia requiring treatment ($n = 4$), stroke ($n = 1$), and gastrointestinal bleeding ($n = 4$). One patient had right heart failure with right-sided volume overload and echocardiographic findings of right ventricular dysfunction at enrollment. Clinicians were able to complete all clinical components of a LVAD patient evaluation during the videoconferencing visits (Table 1, Supplementary Table S1). Medication and LVAD speed changes were conducted remotely at a similar or somewhat higher rate compared with in-person visits. On average, videoconferencing visits were 10 minutes shorter than in-person visits. However, a limitation of this study is that physical examination findings during videoconferencing visits were not confirmed by in-person examination on the same day. During 4-week follow-up, 1 patient was hospitalized for gastrointestinal bleeding after videoconferencing visit and 1 patient was hospitalized for medical noncompliance and right heart failure requiring intravenous diuresis after both in-person and videoconferencing visits. Patients had a 99% positive response to 12 questions on the Telehealth Usability Questionnaire and saved an average 118 minutes of travel time during videoconferencing visits.

Table 1. Outcomes of Patients in the TeleLVAD Study

Outcomes	Videoconferencing Visit ($n = 11$)	In-person Office Visit ($n = 11$)
Outcomes: Feasibility		
Blood pressure measurement	11 (100)	11 (100)
Auscultation of heart and lungs	11 (100)	11 (100)
Visual assessment of jugular venous pulsation and edema	11 (100)	11 (100)
Driveline inspection	11 (100)	11 (100)
LVAD interrogation	11 (100)	11 (100)
Medication changes made during the visit	8 (73)	5 (45)
LVAD speed changes made during the visit	1 (9)	0 (0)
Outcomes: adverse events		
Rehospitalization within 4 weeks of the visit	2 (18)	1 (9)
Reason for rehospitalization	Medical noncompliance and right heart failure requiring intravenous diuretics Gastrointestinal bleeding	Medical noncompliance and right heart failure requiring intravenous diuretics

Values are number (%). LVAD, left ventricular assist device.

Discussion

The results of this pilot prospective study demonstrate for the first time that videoconferencing visits can be used to complete a comprehensive examination and accomplish management decisions in LVAD patients remotely with high patient satisfaction. Furthermore, we show for the first time that medication management and LVAD speed change can be conducted remotely in LVAD recipients. We believe that these pilot findings have important implications during the current novel coronavirus disease-2019 pandemic. Future larger randomized trials are needed to evaluate the long-term safety of remote videoconferencing management and its efficacy in reducing adverse events in the high-risk LVAD population.

Declaration of Competing Interest

Dr Vidula has received a research grant from Abbott. Dr Gosev is a consultant for Abbott. All other authors have no conflicts of interest to declare.

Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.cardfail.2020.10.001.

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