Editorial

Ethical challenges and terminal deactivation of left ventricular assist device

Tony Makdisi[1], **George Makdisi**[2]

[1]Palliative Care Division, University of Massachusetts Medical School, Berkshire Medical Center, Pittsfield, MA, USA; [2]Division of Cardiothoracic Surgery, University of South Florida, Tampa General Hospital, Tampa, FL, USA

Correspondence to: George Makdisi, MD. Division of Cardiothoracic Surgery, University of South Florida, 5 Tampa general circle, Suite 820, Tampa, FL 33606, USA. Email: gmakdisi@hotmail.com.

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Introduction

Heart failure is one of the most important cardiovascular problems in the United States with 5.7 million adults afflicted in 2015 (1). Left ventricular assist devices (LAVD) implantation in patients with congestive heart failure has excellent outcomes when compared to medical therapy (2,3) and has become an important option for the treatment of patients with advanced heart failure (4-6). Currently, approximately 5,000 to 6,000 patients are treated annually with LVADs (7). Nowadays, the number of LVAD implantations exceeds the number of annual heart transplantations worldwide (6). LVADs are used as a bridge to recovery, a bridge to transplant (BTT), a bridge to decision, and as destination therapy (DT) (6). This rapid increase in the use of LVAD, and modalities of use, raised ethical questions about its use, patient's autonomy as in most of the time the patient and surrogates are overwhelmed with the critical condition the patient is presenting with, and the details about this new technology. How do we ensure the patient's beneficence? Is the new condition acceptable by the patient or not? Is the goal the quantity or the quality of life (8)? What is the psychologic status of the patient? Will he or she accept having this metallic pump inside his or her body ticking all the time? Will he or she be able to handle care of the LVAD (as changing batteries, taking care of LVAD drive to avoid infection, anticoagulation with its complications and regular blood tests and regular follow-up with the LVAD medical team?

Furthermore, is it ethical in emergent implantation cases like our patient to perform LVAD without full evaluation of patient's medical comorbidities? other questions could be raised in emergent cases: about patient's autonomy, whether decision about using LVAD should involve patient's surrogates and family hence the need of strong social support, and the issues of informed consent in this emergent condition and limited time available before initiation the support. This decision of LVAD support should be balanced against non-maleficence of the patient. All these gray area and unanswered questions could create disagreement among surrogates, disagreement among health care providers, and surrogates over stopping or continuing this modality of treatment (8,9).

LVAD deactivation might occur in three scenarios: (I) patient with LVAD and in critical condition in intensive care unit, in this condition there is no exit strategy and the treatment is considered futile or no longer meets its intended goals. In this condition deactivation of LVAD is in the best interests of the patient; (II) patient with DT LVAD asking for deactivation, in this case there are some discordance between medical experts about the legality of deactivation which also varies between health systems and legal status worldwide as some consider this as physician assisted suicide or euthanasia (10), while other consider it as letting patient die (11) some consider it as for patient autonomy and beneficence, and weighing of benefits and burdens (12-15). We think that we have an obligation of beneficence or acting in the patient's best interests, but this must be balanced against non-maleficence or doing no harm to the patient, the decision although it is medical decision, it is ultimately controlled by the patient's autonomy and the right of choosing his treatment, and medical team should honor the patient request; (III) patient undergoes a

LVAD implantation as a bridge to transplant, and becomes non-transplant candidate due to the LVAD implantation complications (stroke, renal failure needing dialysis, inability to perform a to improve physical condition) or acquiring a new diagnosis that could be a contraindication for transplant (as a newly diagnosed malignant cancer) this new development will preclude the patient from being a transplant candidate and switch him to LVAD as DT, in this condition if the patient asked for deactivation. Here we are presenting a patient case to discuss this condition and the ethical concerns about this unique condition.

Case presentation

A 54-year-old female presented to the emergency room in local hospital where she works as a registered nurse with crushing chest pain, she underwent an emergent cardiac catheterization which showed a 90% proximal stenosis of left anterior descending artery (LAD) and 70% stenosis in the right coronary artery (RCA). An attempt of coronary stenting was performed unfortunately a dissection of LAD progressed and led to cardiogenic shock, an intra-aortic balloon pump (IABP) was inserted, and the patient was transferred to our hospital. Upon arrival, the patient was still in cardiogenic shock, an emergent surgical revascularization was performed with 2 CABGs. The patient was unable to be separated from the bypass machine. With an ECHO showing low ejection fraction of 5–10%, with a large dysmotility of the anterior left ventricle wall, a decision was made to keep the patient on post cardiotomy extra corporeal membrane oxygenation (ECMO) support to give her heart enough time to recover from the ischemic event and the stress of surgery, and was transferred to the ICU. In the next few days it was obvious that the patient will need long term mechanical circulatory support, as the heart is not recovering with an EF of 15–20% after a week of support. After discussing with the patient's husband and daughter, a decision was made to proceed with LAVD insertion as a bridge to transplant, this was performed 2 weeks after the admission. The patient was extubated two days after surgery; the patient made good progress in the perioperative period mainly due to her excellent physical athletic condition. She was motivated and quickly started physical therapy and rehab while she was in ICU knowing that she stated clearly that she accepts the LVAD as a temporary measure for heart transplant.

During the following few days while the patient was on anticoagulation, she experienced a lower gastrointestinal bleeding, a colonoscopy showed right colon mass, unfortunately the final pathology came back positive for adenocarcinoma, which is a contraindication for transplant, as the candidate should be at least cancer free for 5 years to be eligible to be listed for transplant.

The patient continues to reject the idea of keeping the LVAD support, she insisted on being terminally separated from the LVAD as it was not an acceptable quality of life for her or "the way she would like to live" and clearly stated "this condition is worse than death". A psychologic evaluation showed that she was competent and here decision-making capacity is intact, and her decision is consistent. All attempts from the medical team involved including the mechanical circulatory support team, the ICU team, psychiatry, Ethics team, palliative care team, and social workers to convince her has failed. The family supported the patient's decision and agreed to withdrawal of care, and the patient was given some time to spend with her family before proceeding with withdrawal of care by sedating the patient and turning off the LVAD in palliative care suit, the patient expired few hours later.

Discussion

Patients with end stage heart failure evaluated for LVAD candidacy undergo a complex evaluation process of medical condition, psychological condition, social and financial support. Amongst these extensive cognitive and psychological evaluation, to identify the psychological risk factors which might put patient's care and outcomes in danger, this process also give the medical team a good idea about what the patient perception of the LVAD? And what his expectation of the new device? how he will handle the complications? And the ability of self-care a long term. This evaluation cannot be performed when LVAD is inserted in emergent manner, in this condition the family or surrogates are used as primary source of information about the psychological condition of the patient, and what is considered good and acceptable quality of life by the patient, on the other hand a full medical evaluation for the comorbidities and the contraindication of the LVAD implantation or transplant is impossible to be performed in timely manner. These suboptimal evaluations might lead to LVAD implantation in patients who their candidacy for LVAD implantation should have been denied if normal evaluation process occurs due to their psychological or medical assessments.

In non-emergent LVAD implantation, along with medical management and follow-up, it is important to prepare the patients and caregivers before and after LVAD implantation about their disease, the expectation of LVAD support, what their life will look like, and our expectations of them as LVAD patients, and that includes a discussion about the inevitable deactivation at the end-of-life (16). This pre-operative education could be staged into 3 footsteps: the first step would be that the patients need to understand the heart failure as a disease and understand its trajectory and should have identified a health care proxy and reviewed general advanced directives. The second step is systematic education regarding the purpose and functionality of the device, and the prognosis with and without it (17,18), and the tasks they need to perform. The third step should be a discussion that includes the possibility that a time may come when the device should be turned off and in such case the reason behind turning the device off can be for a reason unrelated to the heart failure itself (sepsis, stroke etc..) which can be enormously challenging to physicians and patients (16,17).

During LVAD support continuous education is vital, repeating step 2 education with continuous and transparent updates about the patient medical condition, complications, is there any improvement or deterioration? Does LVAD continue to give the optimal support needed. How the patient feel toward the LVAD, step three gets more value now as complications should be expected to happen and the patient should be prepared to. Needless to say, that physicians should be skilled and confident in responding to emotional situations like this. Acknowledging the patient and family emotion and showing empathy and wording like: "I am concerned …" or "I am afraid the disease took the best of him/her…" or "I can imagine how hard this must be….".

A discussion that should explain the situation surrounding device withdrawal/deactivation, A major point is to understand how the patient feels toward the LVAD? And what is the religious thinking about deactivation? As for some patients, the device give them reassurance that they are "still alive" and they prefer to keep it "ON" others might be more spiritual and might need reinforcement from their religious leaders that turning the device off means allowing natural dignified death and is considered suicide rather a natural progress of a heart disease, while other think that LVAD is just delaying death which should occur without this unnatural support.

When a decision is made to deactivate the LVAD or if the patient (or surrogate decision maker) requests to have a device turned off, principles of autonomy and self-determination dictate that it should be turned off. Failure to do so is legally "assault" (19).

The process of LVAD separation should be thoughtfully coordinated and facilitated by a multidisciplinary team around patient's comfort and family support. This support should include along with the MCS team, the ICU team, a palliative care team, a psychiatric, a spiritual and social support team. The timing of LVAD deactivation should be chosen by the patient and the family members. The patient and the family should be assured that all symptoms during deactivation with be correctly managed, because of this a multidisciplinary team approach is vital before and during deactivation. For patients who are on a ventilator, it is strongly advised to turn off the ventilator at the same time as the LVAD. It is not unusual after disconnecting the device for some patients to survive for few days supported by the residual function of their own heart. The ideal time where palliative care team should approach these patients and treat their symptoms aggressively that are mainly pain, breathlessness and anxiety.

Conclusions

Patient education about the LVAD, and transparent updates of patient medical condition is vital, this should be started before and continue during support, that includes a discussion about the inevitable deactivation at the end-of-life. If a LVAD patient asks the device to be turned off, we think that we "the medical team" have an obligation to honor the patient's request, if the patient is competent and consistent with his/her decision. When decision is made about LVAD deactivation the process should be coordinated by multidisciplinary team. Many programs committed to LVAD implantation enlist a palliative consult service to help communicate and facilitate discussion around the decision to undergo LVAD implantation.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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