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FAST FACTS AND CONCEPTS #205

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Introduction About 250,000 Americans have end-stage heart failure ('Class IV' by the New York Heart Association criteria, meaning patients cannot carry out any physical activities without discomfort and experience dyspnea or angina at rest). Fewer than 1% of patients, however, will receive a heart transplant. The left ventricular assist device (LVAD) was initially designed as an implanted mechanical circulatory support to extend the life of patients awaiting heart transplants ("bridge therapy"). In 2002, the FDA approved the LVAD not only as "bridge therapy", but also as an alternative to transplantation, or "destination therapy."

The Technology The LVAD is a surgically implanted pump with two conduits, one of which is implanted in the left ventricle, the other into the aorta. Blood is pulled from the left ventricle, and pumped into the aorta, increasing cardiac output and reducing heart failure symptoms. A third conduit passes from the pump through the abdominal wall, and attaches to the LVAD's battery and control system. Right and bi-ventricular assist devices also exist, but are not currently approved for destination therapy. Patients can go home on most types of assist devices. LVAD patients may use a wearable battery system for several hours, which allows them more maneuverability. To qualify for destination LVAD therapy, a patient must have refractory Class IV heart failure, severe systolic dysfunction (ejection fraction <25%), inotrope dependence or very low peak oxygen consumption (<12 ml/kg/min), and sufficient body surface area to accommodate the LVAD.

Outcomes

- LVADs can prolong life. REMATCH, a randomized controlled trial, compared destination LVAD therapy to medical therapy. LVAD patients had 1-year and 2-year survivals of 52% and 29% respectively, compared to 25% and 13% for medically managed patients. The mean survival for LVAD patients was 14 months, compared to 9 months for medically managed patients. Depression and health-related quality of life were improved in LVAD recipients.
- Shorter survival is predicted by poor nutritional status, low serum albumin, coagulation abnormalities, impaired renal function, and signs of right heart failure. A pre-operative risk model has been developed using these factors (Lietz 2005); using this model, the 90-day and 1-year survival for low-risk patients is 93% and 81% respectively, compared to 18% and 11% for high-risk patients.
- Complications of LVAD therapy include stroke, multi-organ failure, bleeding, thromboembolic disease, and sepsis. Peri-operative mortality is very high (33%). Patients generally spend 20% of their survival time in the hospital. Some patients can perform all activities of daily living, but anxiety among patients and caregivers may be significant. LVAD alarms, which occur an average of 6.7 times daily, are particularly distressing.

Discontinuing LVADs and Care Planning LVADs may be implanted as a bridge to transplantation, but later become destination therapy when patients are no longer transplantation candidates. In the rare instance of left ventricular recovery, LVADs can be explanted. More often, LVADs are removed at cardiac transplantation or, in the case of destination therapy, when severe complications arise. When the LVAD is turned off, not only does support to the damaged heart stop, but the non-functioning device causes impediment to the pumping of the native heart, thus in a small way hastening death. Patients usually die rapidly after device discontinuation. Discussions leading to a decision to discontinue the LVAD should focus on its inability to continue to fulfill its intended goals, and the importance of providing comfort care for a dying patient.

LVAD therapy is a surgical therapy which can prolong life and improve function in selected patients, but is associated with very high mortality and treatment burden. Discussions with patients and surrogates to clarify prognosis, goals, and endpoints for LVAD therapy should take place before implantation. These discussions should address the quality of life below which a patient would no longer want to continue mechanical circulatory support, and would want to initiate comfort-only care. Palliative care physicians may be involved in these discussions, and involved in evaluating patients who have suffered complications or request LVAD discontinuation.

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