Cardiovascular Update

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Advanced Heart Failure: Left Ventricular Assist Device

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Heart failure is a growing epidemic in the United States. It's estimated that 5.7 million people are currently affected by heart failure.[1] The rate of heart failure increases with age as well and there are an estimated 670,000 new cases of heart failure diagnosed each year in the United States. Even worse, 50–100,000 people are deemed to have New York Heart Association Class IV heart failure which means they've become unresponsive to medical therapy. When you combine these facts with the prediction that by the year 2030, the incidence of heart failure will increase by 46 percent and therefore effect some eight million people, it's understandable why we call this an epidemic. These are sobering statistics that make both patients and physicians worry about what the future holds when someone is diagnosed with heart failure.

To combat these increasing numbers, recognition and medical therapy still play the first line therapy. However, more patients are becoming unresponsive to medical therapy and need to be advanced to more invasive strategies. One idea outlines that these patients should receive heart transplants which have been the gold standard since 1967, when the first transplant was performed. However, in 2017, there were a total of 3,244 heart transplants performed in the United States. This number has been constant since the 1990s, and due to the disparity of available hearts to patients, the left ventricular assist device (LVAD) was developed.

A left ventricular assist device is an implantable mechanical pump that works with the heart to deliver adequate blood flow to the body. Several pumps have been developed over time. The first initial trial comparing an LVAD to medical therapy began in 2001. This study, REMATCH, demonstrated that the Heartmate XVE was superior in survival rates and quality of life to optimal medical therapy. The next device was the Heartmate II. Implantation began in 2003, and it was approved as a bridge to transplant device in 2008. In 2010, it was approved for destination therapy. Destination therapy is defined as those patients who require mechanical support but who aren't transplant candidates. This is currently the largest group of patients receiving LVAD therapy.[2] The

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As a system of community hospitals in West Central Florida, BayCare is committed to being a leader in providing superior heart care. The BayCare Cardiovascular and Surgical Outcomes book for 2018 is now available, detailing our volume and outcomes data as well as highlighting some of our world-class programs including our heart failure clinics, fast-growing structural heart and arrhythmia programs, and the many clinical research trials available across the system. Download a copy of our 2018 Cardiovascular and Surgical Outcomes book today.

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improvement in patients' quality of life and improved survival however, must be weighed against the increased risk of infection, bleeding, neurologic events and pump malfunction that's due principally to pump thrombosis. This has led to newer pump designs and further studies.

Currently, the most widely used device is the Heartmate III. It's a fully magnetically levitated centrifugal pump. It began its initial implants in 2014 as part of the MOMENTUM 3 trial.[3] It was a randomized trial that compared Heartmate II to III. At six months and again at two years, the data demonstrated that Heartmate III was superior to the Heartmate II in terms of survival, quality of life and morbidities including pump thrombosis. Therefore, it was approved and is now the LVAD that we implant at St. Joseph's Hospital.

Patients who are candidates for LVAD undergo rigorous testing to assess their candidacy for receiving this therapy. Not only do they receive physiologic testing, but the patients and their families must undergo psychological screening and social support evaluation. A patient who's going to be considered for LVAD therapy must have someone to help them through this process. We find that spouses, children, siblings and even friends and neighbors are willing to help and support our patients.

An LVAD is placed via an operative procedure in the chest, similar to other open-heart surgeries. The LVAD is connected to the apex of the patient's left ventricle and then a graft that's connected to the LVAD is sewn to the ascending aorta. This allows the LVAD to pump the majority of the blood that's needed to the body. The pump is powered by a driveline that's tunneled through the subcutaneous tissue in the abdomen and exits the skin. The device is then connected to the controller that supplies the power and settings to the LVAD.

Patients who undergo placement of an LVAD typically stay in the hospital 10–14 days following their surgeries. Some of this time is needed for the body to recover from the operation. During this time, we manage the patient's physiologic needs while also helping with their expectations. Once they've recovered, we continue the teaching that was started preoperatively of how to manage their LVAD. We help our patients and their families become familiar with the device and all the care that it needs. As one can imagine, this takes several days to learn.

BayCare's LVAD program at St. Joseph's Hospital currently manages patients who have both Heartmate II and III devices. Our experience has reflected that of the national experience with increased survival and improved quality of life. Patients are able to go from being essentially in the hospital with cardiogenic shock back to their lives and homes, participating in their communities. With LVAD therapy, we've given these patients new life and allowed them to remain active members in society.

Who Should Be Referred

NYHA III or IV, plus one of the following:

- Inability to walk < one block without dyspnea
- Serum sodium <136
- BUN > 40mg/dl
- Intolerant or refractory to ACE-I/ARB/BB
- Diuretic dose > 1.5mg/kg
- One or more CHF-related hospital admissions within six months
- CRT nonresponders
- Hematocrit < 35%

Past issues of the Cardiovascular Update newsletter are now available online.

View the newsletter archive and previous editions of BayCare's Cardiovascular and Surgical Outcomes book.

References

1) Mozzafarian D, Benjamin EJ, Go AS, et al., on behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics—2016 update: a report from the American Heart Association. *Circulation*. 2016;133:e38-e360.

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3) Mehra MR, Naka Y, Uriel N, Goldstein DJ, Cleveland JC Jr, Colombo PC, Walsh MN, Milano CA, Patel CB, Jorde UP, Pagani FD, Aaronson KD, Dean DA, McCants K, Itoh A, Ewald GA, Horstmanshof D, Long JW, Salerno C; MOMENTUM 3 Investigators. A Fully Magnetically Levitated Circulatory Pump for Advanced Heart Failure. N Engl J Med. 2017 Feb 2;376(5):440-450. doi: 10.1056/NEJMoa1610426. Epub 2016 Nov 16.

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