Two Lefts Make It Right: Cardiac Experts Find Novel Approach to Treat Heart Failure

Circulatory assist devices placed on both sides of heart restore normal blood flow

October 20, 2015 | Michelle Brubaker

A teenage girl faced with sudden rapid heart deterioration, a man in the prime years of his life suffering from debilitating heart failure and a former NFL athlete crippled by end-stage heart failure were all successfully treated with a surgical approach pioneered by cardiac experts at University of California, San Diego School of Medicine.

The work, recently published in *The Annals of Thoracic Surgery*, demonstrated significant benefits of implanting a left ventricular assist device (LVAD) in the right atrium to provide better blood flow through the lungs, giving complete biventricular circulatory support and fully replacing the heart's function.

An LVAD is a small mechanical pump traditionally placed inside the left ventricle – one of four chambers of the heart, located in the lower left of the organ – to help restore blood flow throughout the body. Unlike an artificial heart, the LVAD doesn't replace the heart, but it can mean the difference between life and death for a person waiting for a transplant or suffering from advanced heart failure.

"An LVAD relieves symptoms, such as being constantly tired or short of breath in patients with advanced heart disease," said Victor Pretorius, MBchB, lead author of the report and surgical director of cardiac transplant and mechanical circulatory support at UC San Diego Health. "The caveat is that the LVAD still depends on the right side of the patient's heart to function optimally, and right ventricle failure is a common condition after an LVAD implantation, leaving some patients only partially treated. It is difficult to predict and increases mortality."

Pretorius said biventricular support is required for up to 30 percent of LVAD recipients. Currently, no durable, long-term right ventricular assist device (RVAD) has received Food and Drug Administration approval, and placing an LVAD in the right ventricle, for which it was not designed, may jeopardize the device and heart function.

"An alternative strategy would be to remove the heart completely and replace it with a total artificial heart, but this strategy does not allow for the failing heart to potentially recover, and there is the risk of the device malfunctioning," said Pretorius. "All three patients involved in the study were in desperate need of right-sided circulatory support. Our team placed an additional HeartWare HVAD, the smallest available LVAD, in the right atrium, the upper chamber of the heart, to provide right heart support."

The right atrium is considered a more ideal chamber for placing a mechanical pump to support right-sided circulation. The absence of valve structures ensures unobstructed blood flow into the pump, and the location next to the right lung makes accommodation for the pump's motor in the chest cavity more feasible.

An LVAD is composed of a computer controller, a power pack and a reserve power pack that remain outside the body and are recharged at night. Patients with the innovative BiVAD approach have to carry a duplicate set for each pump, but Pretorius said this is generally well tolerated.

Two of three patients in the study received successful heart transplants after receiving right-sided circulatory support, and the third patient remains in good condition with both LVADs still implanted.

"There is no standard of care for patients with biventricular failure, so using two LVADs to address this critical need gives patients another treatment option and hope," said Eric Adler, MD, co-author of the report and director of cardiac transplant and mechanical circulatory support at UC San Diego Health.

Seven patients at UC San Diego Health have been treated using this strategy. Pretorius and Adler added that more data is needed to evaluate the efficacy of this approach as a long-term solution.

Co-authors of this study include: David P. Cork, MD; Hao, A. Tran, MD; Jorge Silva, MD; Denise Barnard, MD, all with UC San Diego.

Care at UC San Diego Health

Cardiovascular Services

Media Contact

Michelle Brubaker
858-249-0456
mmbrubaker@health.ucsd.edu

Share This Article

Related News

UC San Diego Health Joins Clinical Trial to Treat Sudden Cardiac Arrest
7/28/2021

Study: COVID-19 Infection Combined with Blood Clots Worsen Patient Outcomes
11/23/2020

UC San Diego Health Revives Non-Beating Donor Heart for Successful Transplantation
9/15/2020

Artificial Intelligence Tool Predicts Life Expectancy in Heart Failure Patients
11/13/2019

View All News >

Follow Us

Follow @ucsdhealth