HeartWATCH

SUMMER 2009

A Newsletter Produced by the Texas Heart Institute

Texas Heart® Institute

at St. Luke's Episcopal Hospital

Cardiologist at THI at SLEH Is the First Physician in Texas to Implant a Next-Generation EXCLUDER Stent-Graft

Abstract: A cardiologist at THI at SLEH is the first in Texas to use a new, wider-diameter stent-graft to treat abdominal aortic aneurysms in patients with larger aortic-neck diameters.

Traditionally, the only treatment option for patients with abdominal aortic aneurysms (AAAs) was open surgical repair, but catheter-based technologies have made it possible for cardiologists to treat AAAs with stent-grafts. Until now, however, these stent-grafts have been too small for treating AAAs that have a very wide aortic neck.

In March 2009, the US Food and Drug Administration (FDA) approved a larger, 31-mm–diameter version of the EXCLUDER AAA Endoprosthesis (Gore, Flagstaff, AZ) (see *Figure*), a stent-graft designed to treat patients with AAAs that have an aortic-neck diameter of up to 29 mm. The device is implanted percutaneously, thereby reducing the length of hospital stay and the morbidity and mortality associated with open surgical repair.

The first physician in Texas to implant the wider version of the EXCLUDER stent-graft was Zvonimir Krajcer, MD, Co-director of the Peripheral Vascular Disease Service at the Texas Heart Institute at St. Luke's Episcopal Hospital (THI at SLEH). More than a decade ago, Dr. Krajcer pioneered the percutaneous repair (involving no surgical incision and only local anesthesia) of AAAs. On May 5, 2009, he implanted the 31-mm EXCLUDER in an 87-year-old man, for whom surgery was contraindicated and whose aortic-neck diameter was too large for a traditional stent-graft. This was 1 of the first 31-mm EXCLUDER implants in the United States and the first in Texas. The procedure took approximately 1.5 hours. The patient was able to eat shortly after the procedure and was ambulatory 8 hours later. He was discharged from the hospital less than 24 hours after the procedure. He was able to return to his normal lifestyle, without limitations, 48 hours after being discharged from the hospital.

The EXCLUDER device comprises an electropolished Nitinol stent covered with e-polytetrafluoroethylene (Teflon) fabric. A bonding film attaches the stent to the graft. The endoprosthesis internally relines the abdominal aorta, thus isolating the AAA from the circulation. The device is inserted through small incisions in the patient's leg, using a catheter-based delivery technique. Once positioned in the aorta, the self-expanding stent exerts a radial force that attaches Nitinol anchors to the aortic wall.

The 31-mm–diameter version of the EXCLUDER AAA Endoprosthesis, a stent-graft designed to treat patients with abdominal aortic aneurysms that have an aortic-neck diameter of up to 29 mm.

"Because of its wider diameter, this latest version of the EXCLUDER stent-graft enables us to broaden the range of patients who can have their AAAs treated endovascularly," says Dr. Krajcer. "About 20% of patients who require AAA repair have a wider aortic-neck diameter, so this device will expand the treatment options for these patients. In addition, insertion is less invasive, entailing a faster recovery and a lower postoperative risk of fatal complications than does open surgical repair."

According to the manufacturer, more than 87,000 traditional EXCLUDER devices have been implanted in patients worldwide, so it is a widely accepted treatment option for AAA patients. The 31-mm version of the EXCLUDER, which has been commercially available outside the United States since 2004, has been implanted in more than 3300 non-US patients.

"Physicians at THI at SLEH have been at the forefront of percutaneous treatment of AAAs for more than a decade," says Dr. Krajcer (see *Heart Watch*, Winter 2009; texasheart.org/heartwatch). "By using a percutaneous approach and only local anesthesia, we can achieve the lowest possible risk of complications, even in older patients who have other serious medical conditions. The success of this procedure is yet another example of our center's leading role in the treatment of life-threatening AAAs." ●

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Dr. Krajcer is a consultant for Gore and organizes training courses for that company; THI at SLEH receives educational grants from Gore.

Texas Heart Institute at St. Luke's Episcopal Hospital is Recognized for Superior Heart Care

The May-June 2009 issue of *AARP The Magazine*, the world's largest-circulation magazine, featured an article entitled "The Right Hospital For You," which discussed the benefits of receiving care at the nation's highest-rated hospitals. The article cited data from a survey done by Consumers' Checkbook, a nonprofit research organization. More than 140,000 US physicians in 53 major metropolitan areas rated their local hospitals and also named out-of-town hospitals to which they would most likely send patients with extremely difficult medical problems. These institutions, or "centers of excellence," produce better results because they have more experienced physicians who tend to be familiar with the latest research findings. The Texas Heart Institute at St. Luke's Episcopal Hospital was among 9 hospitals recognized for outstanding cardiac care and was the only hospital in the South to be thus honored.

High School Student Resumes an Active Life After HeartMate II Implantation

Abstract: A high school student who received a HeartMate II LVAS when he was 17 years old has returned to normal activity and looks forward to attending college in the fall.

Improvements in the size and sophistication of ventricular assist devices are making these pumps a viable treatment option for a broader range of heart failure patients, allowing those patients to survive and lead normal lives while they await heart transplants. One example of the successful use of this technology is Donovan Monroe of Houston, who received a HeartMate II Left Ventricular Assist System (LVAS) (Thoratec Corp., Pleasanton, CA) a year ago, at age 17, and has been able to continue his active lifestyle as a high school student.

Donovan was originally referred from Texas Children's Hospital to the Texas Heart Institute at St. Luke's Episcopal Hospital (THI at SLEH) for treatment of cardiomyopathy. He is believed to have developed this condition as a reaction to the chemotherapy he underwent as an infant for Burkitt's lymphoma. Donovan received the HeartMate II LVAS as a bridge-to-transplant, but his physicians hope that the pump will give his heart time to rest and improve, possibly even allowing the pump to be removed and Donovan to be treated with medical therapy.

"Donovan was young and athletic, so he recovered quickly after pump implantation," says Roberta Bogaev, MD, Medical Director of Heart Failure and Cardiac Transplantation at THI at SLEH. "After he was discharged from the hospital, he asked if he could resume playing trombone in his school's marching band. Only recently did I learn that he was also the drum major and participated in some fairly strenuous routines. Donovan showed me a video of his performance, and you would never be able to tell that he has a cardiac pump."

The HeartMate II LVAS is a second-generation blood pump that has undergone extensive laboratory and clinical testing at THI at SLEH. The pump is implanted below the patient's diaphragm with the outflow graft attached to the left ventricular apex and the inflow graft to the aorta. Essentially, the HeartMate II assumes the function of the weakened left ventricle by pumping oxygen-rich blood throughout the body. The pump's single moving part is an internal rotor with helical blades. Powered by an electromagnetic motor, the rotor spins on its axis around a central shaft and imparts kinetic energy to the blood.

Donovan Monroe of Houston, who received a HeartMate II Left Ventricular Assist System.

The HeartMate II's system controller monitors and regulates the pump's operation according to the patient's activity level. The controller receives its power from rechargeable batteries worn in underarm holsters or a waist pack. In the event of low battery power or some other change in the pump's normal function, the system controller alerts the patient with flashing lights and an audible alarm.

"Because the HeartMate II pump weighs 12 ounces and is about the size of a D-cell battery, it is suitable even for patients with small body frames," says Dr. Bogaev. "Because of its wearability, patients like Donovan can leave the hospital and resume most of their normal activities."

For Donovan, those activities included maintaining straight-A grades (even during his hospitalization), achieving a perfect score on the Scholastic Aptitude Test, and attending the senior prom, besides fulfilling his marching band duties. He graduated from high school in May and will be attending Prairie View A&M University in the fall, majoring in music education.

"I may not be able to do things as competitively as I did before, but I'm still doing them," says Donovan. "I'm able to do most of the things that I could do before receiving the pump."

"Here is someone who was not held back by either his heart failure or his LVAS," says Dr. Bogaev. "Donovan has remained incredibly positive about his situation, and that says a lot about his character."

"Many people mentally picture LVAS patients as being tethered to a machine and unable to leave the hospital," she continues. "That's a myth we need to dispel. It certainly isn't the case for Donovan. He is a normal teenager." ●

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Texas Heart Institute Physicians Join the Fight to Prevent Sudden Cardiac Death in Young Athletes

Abstract: THI at SLEH is partnering with the Center for Coronary Artery Anomalies to help prevent sudden cardiac death in young athletes by initiating 2 large-population studies in the Houston area.

Of the approximately 5 million student athletes in the United States, about 50,000 per year may have a potentially dangerous type of coronary artery anomaly that is associated with sudden cardiac death (SCD), particularly in young athletes. These congenital defects account for 25% to 33% of SCDs in young persons—second only to cardiomyopathies, which cause 28% to 36% of such deaths.

In keeping with its mission of cardiovascular research and education, the Texas Heart Institute at St. Luke's Episcopal Hospital (THI at SLEH) is hosting and partnering with an affiliated nonprofit organization, the newly inaugurated Center for Coronary Artery Anomalies (CCAA; www.centerforcaa.org), to help prevent SCD in young athletes. The medical leadership for this endeavor will be provided by Paolo Angelini, MD, a cardiologist and member of the THI professional staff, who is also a Clinical Professor of Medicine at Baylor College of Medicine. Dr. Angelini has published the only textbook on coronary anomalies, has organized international meetings devoted to this subject, and edits a section of the *Texas Heart Institute Journal* concerning these rare defects. He founded the CCAA to promote the study and discussion of coronary anomalies and other causes of SCD in athletes.

Together, the CCAA and THI are developing 4 programs designed to prevent SCD in the young:

1) *Awareness.* By means of articles, symposia, brochures, lectures, and a dedicated website, health professionals and the community will be educated about coronary artery anomalies and their association with SCD.
2) *Training.* Special training sessions will be offered to expand the number of professionals and technicians qualified to detect and evaluate coronary artery anomalies.
3) *Screening.* Effective evidence-based protocols will be developed for screening populations at increased risk, using a variety of strategies that range from clinical examination to the latest diagnostic techniques.
4) *Treatment.* New preventive and interventional techniques will be developed, along with strategies for referring at-risk students to physicians who are knowledgeable about coronary anomalies, cardiomyopathies, and sporting activities.

The initial focus will be on using portable magnetic resonance imaging (MRI) machines to screen approximately 10,000 student athletes at multiple Houston-area schools, in collaboration with the Department of Radiology at SLEH. The screening-protocol MRI scan, which takes about 5 minutes and requires no contrast injections, will provide essential information about the incidence and optimal treatment of high-risk coronary anomalies. Students who have such anomalies will be advised to seek expert medical advice.

In a parallel groundbreaking study, the CCAA will collaborate with the Joseph A. Jachimczyk Forensic Center, in Houston, to identify the true mortality rates associated with coronary anomalies by comparing the incidence of these defects in patients who died of SCD versus patients who died of noncardiac causes. This investigation will also establish the accuracy of the school-based MRI screening protocol.

"In the United States, prevention of SCD is left to a routine physical exam that is clearly inadequate for identifying coronary anomalies and cardiomyopathies, so some young athletes must gamble on whether maximal exertion would be fatal," says Dr. Angelini. "The programs being developed by the CCAA and by THI at SLEH are aimed at elucidating the mechanisms involved in these rare conditions. The resulting insights will likely change the way coronary anomalies are viewed and treated by the general public and the medical profession."

According to James T. Willerson, MD, President and Medical Director of THI, "Furthering the detection, study, and treatment of coronary artery anomalies and the prevention of SCD in young athletes is extremely important. We are pleased to host and partner with the CCAA in advancing this area of research, and we are gratified by the support that this initiative is receiving from the Houston community." ●

For more information:

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Texas Heart Institute at St. Luke's Episcopal Hospital Strengthens Its Partnership with The University of Texas System

Leaders of the Texas Heart Institute (THI) at St. Luke's Episcopal Hospital and The University of Texas (UT) System have signed a new affiliation agreement intended to strengthen a collaborative partnership begun in 2004. The 2 institutions will work together to recruit renowned cardiologists and scientists, advance joint research endeavors, and promote international efforts in cardiovascular education and research.

Participating in the signing were: (front row) Dr. Denton A. Cooley, Dr. James T. Willerson, and Dr. Francisco Cigarroa; (back row) Dr. Kenneth I. Shine, Dr. Larry R. Kaiser, and Mr. Meredith Long.

According to James T. Willerson, MD, President of THI, "This is a partnership of excellence. It will allow THI to expand its research capacity and cooperate with other UT institutions. It will not only help ensure that we maintain our leadership role but also position us for even greater accomplishments in the coming years."

For Denton A. Cooley, MD, President Emeritus and founder of THI and an alumnus of UT, the new affiliation agreement is a source of great satisfaction. "Imagine," he said, "having your alma mater and the institution that you founded and nourished join forces to advance the fight against cardiovascular disease. I am very gratified."

Novel Device Can Prevent Pneumothorax During Vascular-Access Procedures

Abstract: A cardiologist at THI at SLEH has invented a device for preventing pneumothoraces that develop as a complication of vascular-access procedures.

Central venous access

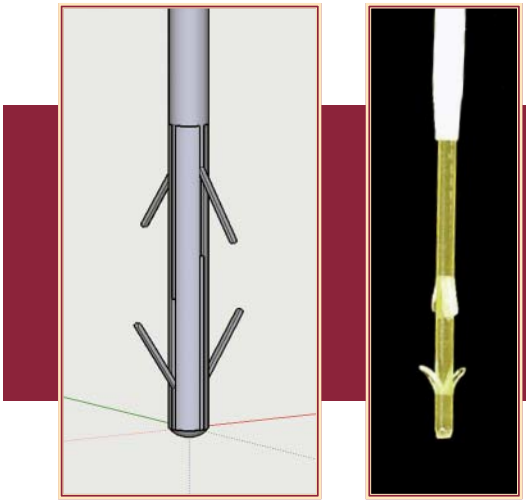
via percutaneous cannulation of the axillary, cephalic, or subclavian vein may cause various complications, including pneumothorax formation. Air entering the pleural cavity from outside the body (open pneumothorax) or from the lung (closed pneumothorax) can lead to lung collapse or total circulatory collapse. A pneumothorax sometimes occurs when a clinician inadvertently penetrates the pleural space during a vascular-access procedure.

More than 11 million central-venous-access procedures (eg, pacemaker and defibrillator implantation, central line placement) are performed in the United States each year. Although the risk of pneumothorax formation during central venous access is relatively modest, the death rate nears 20% when an iatrogenic pneumothorax occurs. Accordingly, Mehdi Razavi, MD, Director of Clinical Arrhythmia Research and an electrophysiologist at the Texas Heart Institute at St. Luke's Episcopal Hospital (THI at SLEH), has invented a device to prevent the formation of 1 type of pneumothorax, which may develop as a result of the central-venous-access procedure.

Certain periprocedural signs suggest that patients may be at increased risk of a postprocedural pneumothorax. One such sign is that air from the lungs enters the syringe connected to the vascular-access needle or cannula.

"Entrance of the needle or cannula into the pleura during percutaneous cannulation does not cause pneumothorax, per se," says Dr. Razavi. "However, subsequent withdrawal of the needle or cannula that penetrated the pleural space may leave behind an open passage that allows air to enter the pleura—a process facilitated by the normal negative intrapleural pressure."

Ultrasound imaging guidance may reduce the risk of this complication but adds to the time and expense of the procedure. Therefore, most vascular-access procedures involving the axillary, cephalic, or subclavian vein are performed without imaging guidance. Thus, theoretically, even a tiny fraction of unsuccessful cannulation attempts could mean thousands of pneumothoraces. If a pneumothorax indeed develops, chest-tube placement is required in almost 94% of cases, causing patient discomfort, prolonging hospital stays, and increasing costs. Chest tubes also increase the risk of other complications, including infection, bleeding, and blood clots.



A prototype of the device, which, when used after a suspected puncture of the pleural space, plugs the needle tract and prevents a pneumothorax.

Dr. Razavi has invented a simple device (see *Figure*) that may be used during vascular-access procedures if a pleural-space puncture is suspected. Briefly, the clinician inserts a slender, bioabsorbable shaft through the lumen of the needle that created the puncture, before that needle is withdrawn. The distal end of the device is passed slightly beyond the end of the access needle, where expanding tines stabilize the device in the surrounding tissue. The needle may then be safely removed, leaving the device behind to plug the needle tract.

In preclinical studies of a prototype of the device, 32 pleural punctures were made in 3 dogs. After being advanced through the needle, the device easily anchored itself to the surrounding tissue. A 30-minute observation period then followed.

"In all 3 animals, a pneumothorax was avoided as long as the device was in place," says Dr. Razavi. "In 2 of the dogs, we removed the device after 30 minutes, and a pneumothorax then developed in both dogs. In the third animal, which had bilateral pleural punctures and only 1 device inserted, a pneumothorax developed only on the side without the device."

A patent is currently pending in the United States for the insertion method and for key aspects of the device itself.

"We believe this technology could prevent pneumothorax formation in many of the millions of patients who require vascular access via the axillary, cephalic, or subclavian vein, regardless of the initial indication for access," says Dr. Razavi. "This device could potentially save many of the patients in whom a life-threatening pneumothorax would otherwise develop as a complication of their vascular access procedure." ●

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New Tools and Techniques Make Implantation of the Gen2 CorCap Cardiac Support Device Easier and Less Invasive

Abstract: Surgeons and researchers at THI at SLEH are leading the effort to develop new tools and techniques for minimally invasive implantation of the Gen2 CorCap cardiac support device.

Despite medical treatment

or the use of biventricular pacemakers, many patients with heart failure have persistent symptoms and an increased risk of repeat hospitalizations. In addition, these patients have continued left ventricular dilatation—a well-recognized precursor of ventricular dysfunction and one of the strongest predictors of decreased survival. To address this problem, surgeons and researchers at the Texas Heart Institute at St. Luke's Episcopal Hospital (THI at SLEH) are pioneering the development of a novel device to reduce or prevent the ventricular dilatation that leads to progressive heart failure.

The Gen2 CorCap Cardiac Support Device (Acorn Cardiovascular, Inc., St. Paul, MN), which is currently under clinical investigation by the US Food and Drug Administration (FDA), specifically targets patients with ventricular dilatation. The polyester-weave device is a custom-fitted sac that is placed around the heart to reduce wall stress and induce cardiac repair (see *Figure*). By gently restraining the heart, the Gen2 CorCap gradually decreases the organ's maximum diameter (a main determinant of wall tension or stress) and improves the efficiency of the heart's energy utilization. Results of preclinical studies of the first-generation CorCap showed reverse remodeling characterized by significant reductions in left ventricular volume and mass, an improved left ventricular ejection fraction, and a gradual return of the dilated, globular heart to a more normal, elliptical shape.

"The CorCap is not a 'corset' that simply holds the heart," says William Cohn, MD, Director of Minimally Invasive Surgical Technology at THI at SLEH. "Studies have shown that the CorCap can lead to a fundamental biologic change in the cardiac myocytes—the cells responsible for the pumping action of the heart."

Clinical experience with the first-generation CorCap has involved more than 600 patients. One study showed a clinical benefit for appropriately selected patients who received the CorCap versus patients who received medical therapy alone (*Ann Thorac Surg* 2007;84:1226-35). In addition, CorCap patients were less likely to need additional cardiac surgery (eg, left ventricular assist device implantation, heart transplantation). They had reduced left ventricular volumes and an improved quality of life—benefits that were sustained at 3-year follow-up evaluation (*Ann Thorac Surg* 2007;84:1236-42).

The Gen2 CorCap Cardiac Support Device and the minimally invasive implantation system developed at THI at SLEH.

Dr. Cohn has led the development of the second-generation CorCap in an effort to reduce the risks involved with the implantation procedure. He and his team at THI at SLEH have developed an implantation system (see *Figure*) comprising 6 long, flexible, snake-like "fingers." The fingers and the device are advanced to the base of the heart through a small incision in the chest wall. Once the Gen2 CorCap is in position, each finger releases its hold on the device and is slid back out of the chest.

"The first-generation CorCap required a full sternum-splitting incision and cardiopulmonary bypass for the implant procedure," says Dr. Cohn. "Now we can use X-ray visualization to implant the Gen2 device through a 2½-inch incision on the left side of the chest, without the aid of cardiopulmonary bypass."

The initial European clinical experience with the minimally invasive Gen2 CorCap was encouraging, leading to initiation of an FDA-sponsored safety trial in the United States. To date, 9 patients at 5 US sites have been treated with the Gen2 CorCap. All of the surgeons who have implanted the device learned the procedure at THI at SLEH, which is the most recent site to enroll patients in the study.

"Implantation of the Gen2 CorCap is safe, simple, and easily mastered," says Dr. Cohn, who has attended and proctored all the clinical cases. "This device, with its 1-hour minimally invasive implant procedure, may prove to be an important, low-risk adjunct to medical therapy in many patients with heart failure." ●

For more information:

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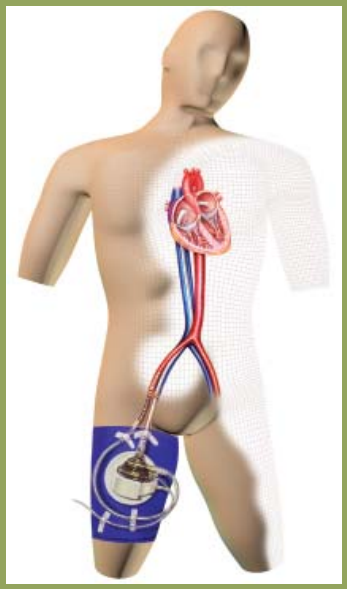
Dr. Cohn is a paid consultant for Acorn Cardiovascular, Inc.

The TandemHeart System Improves the Odds of Survival in Patients With Severe Refractory Cardiogenic Shock

Abstract: Physicians at THI at SLEH are using the TandemHeart Percutaneous Transseptal Ventricular Assist System to stabilize life-threatening cardiac conditions.

Ventricular assist devices (VADs) were originally developed to enable patients with irreversible congestive heart failure to survive until they could receive a heart transplant. Today, however, VADs are used in a variety of situations in which patients need cardiac support, so individual VADs have become increasingly specialized. One such VAD, the TandemHeart Percutaneous Transseptal Ventricular Assist System (CardiacAssist, Inc, Pittsburgh, PA), is designed for immediate, short-term support.

"The TandemHeart differs from other VADs in that it is percutaneous," explains Biswajit Kar, MD, a cardiologist at the Texas Heart Institute at St. Luke's Episcopal Hospital (THI at SLEH). "The pump itself is extracorporeal; the only components inserted into the patient are the intake catheter, which is placed in the left atrium, and the outflow cannula, which is placed in the femoral artery. So if a patient being evaluated in the cardiac catheterization laboratory is found to need substantial cardiac support, the TandemHeart can be inserted immediately. The patient doesn't have to be taken to an operating suite for surgical implantation, which is necessary with other VADs."



The TandemHeart PTVA System. The wearable pump, which remains outside the body, draws blood in via a catheter in the left atrium and returns the blood via a cannula in the femoral artery.

Of the more than 2000 TandemHeart insertions that have been performed worldwide, over 200 have been performed by cardiologists at THI at SLEH. The majority of these procedures were done in patients who had severe refractory cardiogenic shock (SRCS), a condition in which the patient's cardiac function is inadequate despite high doses of inotropic drugs. In about two-thirds of these cases, SRCS was caused by ischemic cardiomyopathy; in the other cases, SRCS had various nonischemic causes, such as myocarditis, valvular cardiomyopathy, and dilated cardiomyopathy.

Without ventricular assistance, the prospects of SRCS patients are grim. The mortality rate is approximately 80% among SRCS patients receiving 3 inotropic drugs and 90% among those who are also supported by an intra-aortic balloon pump.

"Of our SRCS patients, about half were undergoing active cardiopulmonary resuscitation [CPR] at the time the TandemHeart was placed," says Pranav Loyalka, MD, a cardiologist at THI at SLEH. "Without the TandemHeart, nearly all of these patients would have died immediately. In most cases, the device stabilized their condition, enabling them to undergo successful subsequent treatment."

Often, the TandemHeart is removed while the patient is still in the catheterization laboratory, after medical or percutaneous treatment has resolved the SRCS. In other cases, the TandemHeart must be left in place while the patient undergoes a surgical procedure, such as cardiac transplantation, implantation of a longer-term VAD, or definitive surgical correction of the underlying cause of heart failure.

"For example, we had 10 patients who had SRCS related to severe aortic valve stenosis, including 7 patients undergoing CPR," says Igor D. Gregoric, MD, Director of the Center for Cardiac Support and Associate Director of Cardiovascular Surgery and Transplant Research at THI at SLEH. "Normally, SRCS patients with aortic valve stenosis have a survival rate of about 25%, because their condition is too unstable to permit valve surgery. However, because the TandemHeart was used to stabilize these patients' conditions, 80% of our patients survived. Basically, the device reversed the normal survival-to-mortality ratio."

Overall, for SRCS patients who undergo corrective operations (eg, valve repair or replacement, ventricular septal defect closure, left ventricular aneurysm repair), the predicted mortality rate is more than 50%. At THI at SLEH, however, use of the TandemHeart has reduced this rate to less than 25%.

The TandemHeart is also used in patients who need percutaneous coronary intervention but would be at high risk of adverse outcomes without TandemHeart support. About one-third of TandemHeart recipients at THI at SLEH fall into this category.

"The only disadvantage of using the TandemHeart is that the cardiologist needs to be trained to perform the necessary atrial septal puncture for placement of the intake catheter," says Dr. Kar. "However, once the cardiologist has learned this skill, the risk to the patient is minimal, and the potential benefits are tremendous." ●

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HeartWATCH
SUMMER 2009

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Cover: Artwork created and donated by Kermit Eisenhut for the Celebration of Hearts display in the Wallace D. Wilson Museum of the Texas Heart Institute at St. Luke's Episcopal Hospital —The Denton A. Cooley Building.

Calendar of Events

Texas Heart Institute Online Continuing Medical Education Symposia

Visit the Texas Heart Institute's online CME page (www.texasheart.org/cme) and select "Explore CME Courses" to view these archived symposia and other courses.

Heart Failure: Surgical and Medical Breakthroughs in Current Practice
Program Director: Reynolds Delgado III, MD

Tenth Symposium on Cardiac Arrhythmias
Program Director: Ali Massumi, MD

Emerging Trends in the Management of Arrhythmias and Pump Failure in Patients with Advanced Heart Failure
Program Directors: Jie Cheng, MD, PhD, and Reynolds Delgado III, MD

Selected Upcoming Local, National, and International Meetings

Heart Failure Society of America 13th Annual Scientific Meeting
September 13–16, 2009 • Boston, Massachusetts
www.hfsa.org/annual_meeting.asp

American Society of Nuclear Cardiology 14th Annual Scientific Sessions
October 1–4, 2009 • Minneapolis, Minnesota
www.asnc.org/asnc2009/

American College of Surgeons 95th Annual Clinical Congress
October 11–15, 2009 • Chicago, Illinois
www.facs.org/clincon2009/index.html

American Society of Anesthesiologists Annual Meeting
October 17–21, 2009 • New Orleans, Louisiana
www2.asahq.org/web/index.asp

American Heart Association Scientific Sessions 2009
November 14–18, 2009 • Orlando, Florida
http://scientificsessions.americanheart.org/portal/scientificsessions/ss/

For information about Texas Heart Institute CME activities, please e-mail cme@heart.thi.tmc.edu or call 832.355.2157. To view or complete selected CME presentations (certificates are available online), please visit www.texasheart.org/cme. New courses are added regularly.

For 18 consecutive years, the Texas Heart Institute at St. Luke's Episcopal Hospital has been ranked among the top 10 heart centers in the United States by *U.S. News & World Report*'s annual guide to "America's Best Hospitals."