

Robotic Heart Surgery

Power and Precision for Better Outcomes

By Alex Strauss

Coronary artery disease is the leading cause of death in the U.S. and a life-limiting problem for hundreds of thousands of patients. While surgery can save lives, patients who undergo traditional open coronary artery bypass often feel they pay a price in bodily trauma, post-surgical pain, and risk of infection and blood loss.

“Because traditional open heart surgery requires sternotomy

(splitting the breast bone and spreading the rib cage to expose the heart), patients sometimes complain of pain years after the procedure,” said cardiac surgeon Aqeel Sandhu, MD, the Harvard- and Cleveland Clinic-trained medical director of Cardiothoracic Surgery at Mercy Medical Center in Canton.

But thanks to the addition of an advanced da Vinci Robotic Surgical System at Mercy, Dr. Sandhu can now offer patients a

safer, less traumatic surgical alternative to traditional open heart and laparoscopic surgery. Mercy is the first hospital in a five-county region – including Stark, Wayne, Holmes, Carroll and Tuscarawas Counties – to offer the da Vinci system, which enables surgeons to operate with unmatched precision utilizing 3D-high definition vision.

Aqeel Sandhu, MD, is the Harvard- and Cleveland Clinic-trained medical director of Cardiothoracic Surgery at Mercy Medical Center in Canton. Dr. Sandhu performs complex revascularization procedures with robotic assistance through incisions no bigger than a fingertip.



THE DA VINCI AT MERCY MEDICAL CENTER

“The robot gives us the ability to mimic the movement of hands inside the chest in a closed setting,” explained Dr. Sandhu, who now performs complex revascularization procedures through incisions no bigger than a fingertip.

“In essence the jaws of the robotic arms function even better than hands because you have 720 degrees of freedom of motion. Some surgeons shy away from minimally invasive procedures, even though they are far easier on patients, because it can be difficult to see and to move, but the robot levels the playing field.”

Because of the growing demand for minimally invasive alternatives to traditional surgery, Mercy Medical Center now has two digital operating rooms, or endosuites, equipped for the da Vinci system. Both feature voice-activated, hands-free controls and high-definition video monitors.

The da Vinci system consists of a mobile bedside cart with four robotic arms and a separate control console at which the surgeon sits to perform the surgery. Three of the robotic arms are fitted with surgical instruments and the fourth holds a pencil-sized endoscopic video camera.

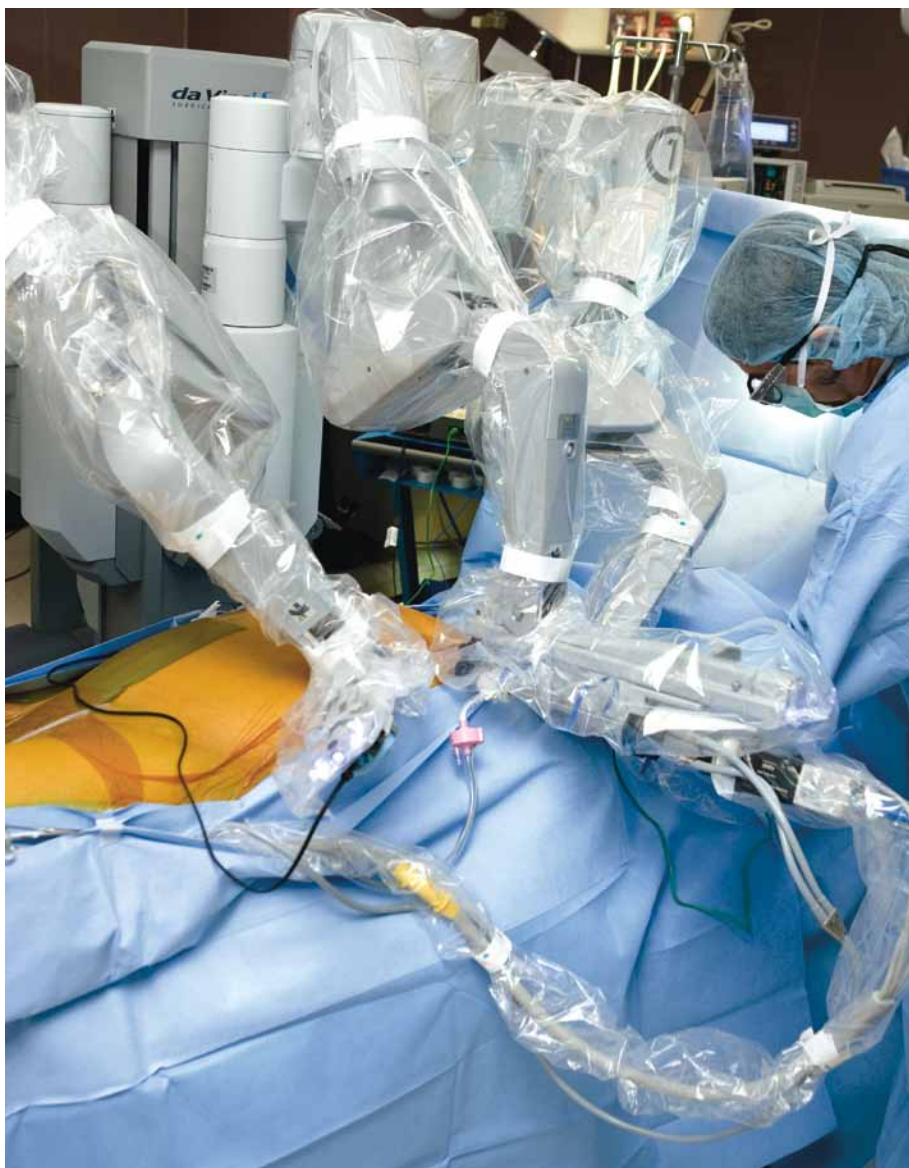
During surgery, Dr. Sandhu sits at the console's remote controls to maneuver what are now his three hands in an illuminated, magnified view of the surgical site. Improved dexterity and depth perception as well as the stability of the camera and the ergonomic design of the controls makes the surgical experience more comfortable for the doctor and safer for the patient.

"The visualization is so much better than we have ever had before because it is magnified and it's in high definition, so you can see things that you can't always see in minimally-invasive heart surgery or even in open heart surgery," observed Dr. Sandhu.

Although less traumatic for the body than open heart surgery, even traditional laparoscopy cannot provide the visualization and dexterity that da Vinci does. Rather than using the abdominal wall as a sort of fulcrum, as laparoscopy does, the da Vinci system seamlessly translates delicate hand, wrist and finger movements at the control console into precise, real-time movements of surgical instruments inside the patient. The surgeon can even set the ratio between his hand movements at the console and the movement of the arms at the surgical site, a feature especially helpful when working in very close quarters, such as the heart chambers, where the highest precision is vital. The system also corrects for a surgeon's natural tremor.

SINGLE VESSEL SMALL THORACOTOMY

Single vessel small thoracotomy (SVST) is the robotic cardiothoracic procedure currently being performed at Mercy by Dr. Sandhu. The procedure involves bypassing the most important coronary branch, the left anterior descending (LAD), using the left internal mammary artery (LIMA). The procedure is also commonly referred to as 'LIMA to LAD'. Because of the volume of blood that passes through the LAD, bypass is typically considered preferable to stenting this vessel due to the risk of



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restenosis. Likewise, even the use of veins harvested from the leg is inferior to using an internal mammary artery for the bypass because of the blood pressure involved.

"Due to the nature of exposing a vein to arterial pressure, the longevity of the vein graft is much less than the arterial or LIMA graft," said Ahmed Sabe, MD, Harvard-trained interventional cardiologist and medical director of the Mercy Heart Center. "We know that within four to seven years a significant percentage of those veins will get into trouble with blockages and require a stent or reoperation. To make it easier and safer for our patients, we combine robotically harvesting an internal mammary artery through a small incision between the ribs with stenting. The da Vinci makes it easier to provide a longer-lasting solution for patients."

"Although drug eluting stents have reduced the incidence of restenosis, stents are not always the best answer," said

Dr. Sandhu. “On the other hand, we know that LIMA to LAD protects the heart, stays open the longest, and confers longevity, but it has traditionally required sternotomy of the ribs, and the risks and problems associated with this approach.”

Despite its complexity, Dr. Sandhu chose to launch Mercy’s robotic heart surgery program with the SVST procedure.

“Even with the robot, this is a difficult procedure, but I wanted to start with revascularization because I feel like the robot has so much to offer in coronary disease. With this procedure, there is minimal pain, minimal bleeding and minimal trauma. Patients are back on their feet and back to normal activities much more quickly.”

A heart stabilization and exposure device allows the heart to

continue beating while the surgery is performed, eliminating the need for a heart-lung machine and its associated risks. A lower risk of blood loss also reduces the chance that the patient will need a transfusion. Dr. Sandhu said he expects to soon be performing this procedure without the thoracotomy incision, allowing it to be done entirely endoscopically.

“Even in conventional SVST surgery, with the thoracotomy incision, there is an advantage to using the robot because we do not have to crank up the chest wall in order to see what we are doing. This is a big advantage for patients who don’t have to deal with numbness along the left sternal border for several months. My cardiology colleagues are telling me that they are seeing patients go home without pain medication after this procedure. This is unheard of.”

During surgery, Dr. Sandhu sits at the console’s remote controls to maneuver what are now his three hands in an illuminated, magnified view of the surgical site. The da Vinci system seamlessly translates his delicate hand, wrist and finger movements at the control console into precise, real-time movements of surgical instruments inside the patient.



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HYBRID REVASCULARIZATION

Although some patients have blockages in a single vessel, most patients with coronary artery disease have some level of blockage in more than one vessel. Angioplasty with stent placement remains the least invasive method for reopening many of these blocked vessels but may not be the best choice for larger arteries. With the da Vinci Surgical System in place, patients no longer have to choose between the longevity associated with open heart surgery and the minimally invasive nature of angioplasty and stenting.

“Now with the promising results of stents, we are able to use both procedures in a single patient,” explained Dr. Sabe, who along with Dr. Sandhu, completed this area’s first ‘hybrid’ revascularization case in September.

“With traditional open heart surgery, including bypassing arteries by venous conduit, it is not unusual that patients often feel afterward like they’ve been run over by a truck,” he said. “In contrast, with the ease and safety of using the robot, the most important arteries like the LAD can make use of the internal mammary arterial conduit and the stents can be reserved for the smaller arteries totally avoiding the use of venous grafts from the leg. It’s the best of both worlds.”

A 56-year-old Strasburg, Ohio, man was the first to undergo both procedures at Mercy. After a successful



PHOTO COURTESY OF MERCY MEDICAL CENTER

With the da Vinci Surgical System in place at Mercy Medical Center, a patient can have open heart surgery and angioplasty and stenting. This 'hybrid' revascularization was first performed at Mercy in 2009 by Dr. Sandhu, who completed a robotic SVST procedure on a patient's major heart vessels in June, and by Ahmed Sabe, MD, who performed angioplasty on the same patient in September as planned to open smaller vessels. Dr. Sabe, shown here, is a Harvard-trained interventional cardiologist and medical director of the Mercy Heart Center.

robotic SVST procedure on several major heart vessels in June, he returned in September as planned for an angioplasty to open smaller vessels.

“By offering both types of procedures, we have the freedom to decide what is best for each individual patient,” said Dr. Sandhu, who added that robotic revascularization will not replace traditional open heart surgery in all cases.

“Patients who have many adhesions in the chest wall from past surgeries are not good candidates for the robot,” he said. “Likewise, with patients who are morbidly obese where it's difficult to get proper exposure or in cases where the heart is very sick and you need maximum exposure and maximum protection. You really have to weigh the risks and benefits in each case.”

THE FUTURE OF MERCY HEART CARE

“Our commitment to the community continues with the early adoption of the most advanced technology and with innovation in applying the best cardiac care to maintain the largest experienced leadership,” said Dr. Sabe. “We lead nearly 500 hospitals

in the care for acute myocardial infarction as the nation's first certified chest pain center. We are the first in the nation to utilize that Tandem Heart and total cardiopulmonary bypass within our emergency department to resuscitate full cardiac arrest patients. Also, Mercy is the home of the world's first and area's only Cardiac Catheterization Lab located in an ED.”

“With the introduction of Mercy's daVinci Robotic Heart Program, we are moving fast into performing multivessel coronary bypass procedures entirely endoscopically. When we begin offering transthoracic endoscopic computer-enhanced coronary bypass (TCAB), we will truly have a complete program,” added Dr. Sandhu.

“The robotic system will play an increasingly important role in the care of the cardiac patient at Mercy,” said Dr. Sabe. “It provides confidence for doctors and patients when we know that we have the ability to offer the best procedure, or combination of procedures, for each individual patient.”

For more information about robotic-assisted heart surgery at Mercy Medical Center, visit www.cantonmercy.com. ■

