GENETIC ISOLATION

Studying the Hutterites

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A DIFFERENT KIND OF

OR

BY MEGAN SEERY

SURGEON SARAH TEMKIN USES THE DA VINCI ROBOT FOR GYNECOLOGICAL PROCEDURES, INCLUDING ENDOMETRIAL CANCER RESECTIONS. PHOTO BY DAN DRY
When he faced a coronary bypass, Joe Sison never imagined the surgery would be done by a robot.

But when a stress test revealed that one of his three stents was fully blocked, Sison balked at open-heart surgery.

“There was no way I was getting my chest cracked open,” Sison said. “I didn’t want to be lying around [recuperating] for months.”

Desperately seeking an alternative, the 60-year-old discovered a procedure that would allow him to get the bypass he urgently needed without having a surgeon saw through his sternum. All that would delve into his body would be the arms of a robot.

“It sounded good,” he said. “I’d never heard of it before.”

Many people haven’t. Few doctors in the world are capable of using a robot to perform bypass surgery, and no one has performed as many as Sudhir Srivastava, MD.

“The work is to truly change the direction of cardiac surgery,” said Srivastava, who joined the University of Chicago Medical Center in July 2007. “We want to create a phenomenon where surgeons will have to learn this technique.”

Srivastava estimates that 97 percent of coronary bypasses are still performed conventionally, by cutting the breastbone to access the chest. About 70 to 75 percent of those patients must have their blood routed to a heart-lung machine during the procedure. After operating, the surgeon wires the breastbone together.

Sison knew he needed a bypass for more than a year but was adamant about keeping his chest intact. Then he found Srivastava and da Vinci.

Benefits and Limitations

The da Vinci robot—which is used for many kinds of procedures, like removing cancerous prostates or performing hysterectomies—is an improvement from earlier minimally invasive surgeries in which the surgeon uses specialized instruments, such as a grasper and scissors, that have limited dexterity. The doctor views his or her work on a two-dimensional monitor located next to the patient. About 2 to 3 percent of U.S. bypass surgeries are performed this way, Srivastava said.
However, with the da Vinci robot, the doctor operates from eight feet away. Sitting at a remote console, the surgeon uses special gloves to manipulate the robot, providing a natural range of wrist motion while eliminating hand tremor.

“There are almost 370 degrees of freedom, even more than with your own hands,” said Hisham Bassiouney, MD, director for the Non-Invasive Vascular Laboratory at Chicago, describing how the computer allows for more than a full circle of motion in one direction. “It emulates your own hands within the body.”

The lack of depth perception in laparoscopy can make subtle visual findings, such as an instrument’s proximity to an artery, difficult to interpret, said Sarah Temkin, MD, an expert in gynecologic oncology.

“Laparoscopy disconnects the surgeon from the tissue she is operating on,” said Temkin, who has performed 28 gynecological procedures, including endometrial cancer resections, with the da Vinci.

Like earlier minimally invasive procedures, robot-assisted surgery requires making dime-size incisions in the body to place sleeves that function as ports for a video camera and specialized instruments. The da Vinci robot is then docked to the ports.

But unlike traditional minimally invasive surgery, robot-assisted surgeons see a three-dimensional view of the body made possible from a distinctly robotic feature: Because the robot doesn’t experience fatigue, it can hold a heavy, three-dimensional camera for long periods of time—and more steadily than possible in human hands.

While the da Vinci system enhances surgery from the doctor’s perspective, Temkin finds that the true benefit of robotics is for the patients.

“It’s usually a one-day hospital stay, as opposed to five days with conventional surgery,” she said of gynecologic oncology patients. “It’s a lot easier to get started on chemotherapy or radiation therapy for cancer postoperatively if you had five small incisions during the procedure and then you can get out of bed the next day.”

It’s easy to recognize the crossover appeal of shorter recovery periods. Departments that use the Medical Center’s two da Vinci machines—cardiology, gynecology, pediatrics, transplants, urology and vascular—performed 317 robot-assisted surgeries in 2007, ranging from removing prostates and cysts to replacing the vaginal vault and performing liver resections. The popularity of robot-assisted procedures has led to frequent logistical discussions during robotic surgery meetings.

**FIRSTHAND EXPERIENCE**

Joe Sison checked in for the pioneering robotic cardiac surgery at 5:30 a.m. one Monday—with his wife, Nellie, by his side—in the Mitchell Hospital waiting area. Minutes later, an operating room transporter called him to pre-operative care.

Sison’s would be a typical da Vinci surgery: The surgeon sits at a console across the room while the patient is hooked up to the robot through the tiny holes that function as ports. The adjoining patient cart looks like a six-foot-tall Transformer. On the cart’s monitor, tiny forces move across the screen as Srivastava takes the internal mammary artery down. He glances up from his seat at the operating console and asks a nurse to change an instrument.

The robot’s corresponding arm suddenly glows with a soft green light, which means it is ready for the new instrument to be inserted. A message appears on the attached monitor: “Ready. Prepare patient cart for surgery.”

Normal-sized tools would look huge on the robot’s pencil-width instrument holders. Instead, the machine uses scaled-down instruments with regular tips.

As the doctor operates, the machine’s long arms travel delicately; there are no big, grandiose movements here.

Those slight, real-time actions are identical to those at the console, where Srivastava sits.

To the distant eye, it appears he’s driving an arcade racing game with an invisible steering wheel.

The console “windshield” is his three-dimensional monitor, which now shows an extremely close-up picture—magnified 12 times—of tiny veins on the pericardial sac.

Srivastava’s feet press on two of the machine’s five foot pedals: harder on one pedal for the camera to focus, gently tapping another to move the da Vinci's arms forward.

He uses the foot pedals and hand controls simultaneously—as if he were driving—and cannot stare down at his feet or hands. His focus remains on the task before him.

But Srivastava sometimes must leave the virtual surgery to get his hands dirty. About 10 to 12 percent of his patients are converted to conventional open surgery because they’re losing too much blood.

Sison’s procedure went beautifully, Srivastava said. It lasted 90 minutes—shorter than average—and Sison was eager to get up and move around. He left the hospital only a few days later.
Like earlier minimally invasive procedures, robot-assisted surgery requires making dime-size incisions in the body to place sleeves that function as ports for a video camera and specialized instruments.
“Since urology had extensive experience, I worked with them to develop our protocol,” Bassiouny said. “Working from a team approach allows us to offer a minimally invasive procedure and still provide that gold standard of care.”

Before working with the robot in an animal lab, Bassiouny, like all surgeons new to da Vinci, trained in a dry lab where he used the robot to sew artificial limbs. Bassiouny has performed five robot-assisted aortic repairs for aneurysms and blocked aortas and said this minimally invasive approach offers distinct advantages over conventional open repair or using stent technology.

“Pure laparoscopy is like puppetry,” Bassiouny said, referring to earlier minimally invasive techniques. “With robotics, it’s a new dimension.”

THE HUMAN TOUCH

Despite the robot’s advantages, there are some situations in which nothing replaces the human touch. Surgeons like Greg Zagaja, MD, note the loss of haptics, or sense of touch, on the operating room floor.

“The robot doesn’t deliver tactile feedback,” said Zagaja, assistant professor of surgery in urology. “There are patients, such as people with bulky tumors, who probably are best served to have the surgeon using his hands.”

Feeling provides tactile information about how resistant tissue is to cutting or a blood vessel is to sewing. When using the robot, surgeons must make judgments on how much force to apply based on visual assessment. If the machine pulls too hard, it can tear a patient’s tissue.

Intuitive Surgical, which makes the da Vinci robot, is developing sensory gloves to allow surgeons to feel while they operate. The gloves greatly decrease the loss of natural touch, Zagaja said.

Many surgical residents are learning from the technology that is currently available, said Donald Liu, MD, surgeon-in-chief for Chicago’s Comer Children’s Hospital.

“Our residents will be trained to do things here that other residents will never, ever see,” Liu said. “The newest, coolest and best areas are here.”

Still, some basics of surgery, such as familiarity with the body, are best learned firsthand. That’s why Zagaja advocates that all surgical residents possess a combination of robot-assisted and conventional operating skills.

“We need to make sure that what they’re learning is supported by fundamentals,” he said. “The da Vinci is a tool we use, but the idea behind it was to make surgery more natural.”

Exactly three weeks after his bypass, Sison was back in his natural element. Having already returned to his full-time job, he showed up in church soon afterward to perform with his gospel band, the Sacred Heart Prayer Group.

“I feel great, I feel alive,” he said as he prepared to play keyboard. “People look at me and they can’t believe that I just had surgery.”
“He would only have the pain for an hour, and then it would go away,” Gonzales said. “I thought it might have been due to something he ate at school.”

Working math problems in class one day, her son, Jaime Bazan, felt a discomfort he’d experienced more than a dozen times in his lower left abdomen. This time, however, when he tried to stand up and stretch to ease the soreness, the pain nearly paralyzed him. “I could barely walk, my side was hurting so bad,” he said.

Jaime was diagnosed with a serious kidney blockage, the real cause of those persistent “stomachaches.” An X-ray later revealed Jaime’s left kidney resembled a “blown-up flower,” his mom said.

Gonzales feared that diagnosis came too late to correct the blockage without scarring Jaime for life.

Fortunately, a special, non-invasive procedure would quiet those fears and make Jaime the first Chicago pediatric patient to undergo robot-assisted urologic surgery.

“When her 11-year-old son began to complain of mild stomachaches, Denise Gonzales at first chalked them up to merely a sensitive stomach.

“[He would only have the pain for an hour, and then it would go away],” Gonzales said. “I thought it might have been due to something he ate at school.”

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“We’re getting excellent operation results, and they go back to play much more quickly.”

LENS TIME RECUPERATING ALSO MEANS THAT PEDIATRIC PATIENTS MISS LESS SCHOOL AND THEIR PARENTS TAKE LESS TIME OFF WORK.