

# Da Vinci's robot: Surgery is getting a renaissance

April 25 2013, by Katie Jacobs

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Nurses gather around the da Vinci robot at Mount Nittany Medical Center.  
Credit: Penn State

(Medical Xpress)—Robots are everywhere these days. They roam Mars, solve Rubik's cubes and vacuum our floors. Now, a robot named da Vinci is helping patients across the Penn State region get the major surgeries they need with less pain, complications and recovery time.

The da Vinci robot looks formidable: attached to the robot's body are four large, multi-jointed arms that narrow to sharp-looking instruments. But despite its intimidating looks, da Vinci is designed to be gentle. Robotic surgery is a type of laparoscopy (or minimally [invasive surgery](#)), which uses very small incisions that are sometimes only 1/4-inch long. These tiny incisions mean much less pain, scarring and [recovery time](#) – enabling patients to get back on their feet sooner.

State-of-the-art components are the key to da Vinci's success. High-definition imaging and stable, "wristed" instruments allow for maximum visibility and stability while the control console translates the surgeon's [hand motions](#) into perfectly precise surgical movements. This impressive range of skills enables da Vinci to be used for a wide spectrum of [surgeries](#), including gynecologic, cardiac, thoracic and other general surgeries.

Mount Nittany Physician Group surgeon Dr. Shreya Patel, who completed her residency at the Penn State Milton S. Hershey Medical Center, is one of five surgeons at the hospital who uses da Vinci. Patel has been operating the robot since January 2012 and has seen firsthand how it helps ease the surgery experience for her patients.

"There's a huge improvement in recovery. I'm amazed at how quickly these patients are feeling better," she stated. "Oftentimes, they're on their feet and ready to go home within 24 hours."

Although technically advanced, robotic surgery doesn't mean "pre-programmed" surgery. With the da Vinci system, the surgeon makes the incisions herself, inserts the camera and instruments manually, and attaches them to the robot's arms. She then leaves the patient's side for the control console, where she orchestrates all of the robot's motions. The robot cannot function on its own and cannot make any movements without the surgeon's command. A patient's assistant is always next to

the operating tables to observe and switch out instruments if needed.

Dr. Gerald Harkins, medical director of the minimally invasive gynecologic surgery program at Penn State Hershey Medical Center, began working with the da Vinci robot when it first arrived at Hershey in 2010. At first, Harkins and his colleagues were careful about who they chose for the first surgeries with the robot.

"With such a new technology, we were very selective at first. We began the transition with only the most specialized cases," Harkins said. "Since then, we've decided to make a full commitment to robotic surgery."

In the three years since, Hershey Medical Center's Obstetrics and Gynecology department has progressed to performing 80 percent of their surgeries robotically. The surgeries are done approximately eight to ten times a week, and Harkins said they now get many referrals from other doctors whose patients are interested in receiving robotic surgery.

Harkins believes one of the greatest benefits of the da Vinci system is that it decreases the number of patients who have to go through invasive open surgeries. Women with cases too severe for other minimally invasive surgeries are often qualified for robotic procedures.

"The robot opens the doors for us to work with patients with more complicated illnesses, such as severe endometriosis and cancer," Harkins explained. "This has resulted in our department performing no open surgeries at all."

Harkins finds that severe endometriosis patients are the demographic most impacted by robotic surgery. Endometriosis is a condition in which uterine tissue grows outside the uterus. It affects 10 million women in the United States, causing severe pain and, in some cases, infertility. In the past, women with severe cases needed major surgery to remove the

outgrowth.

"A lot of these patients, even today, are told they'll need open surgery, which causes a host of problems of its own: a lot of pain, a lot of scarring and a lot of time off," Harkins said. "With the da Vinci robot, they don't need to go through that. With these women, we're able to apply the robot to the group that needs it most."

Harkins described how the da Vinci system has three highly technical elements that enable it to work on these severe cases. First, is the state-of-the-art video imaging, which uses a high-definition 3-D camera to provide a better picture and enhanced depth perception. Second are the robotic arms which hold and control the camera and instruments. They're extremely stable and precise, with no shaking like there may be with a human arm. This also leads to a clearer picture and finer control of the surgical instruments. Third are the instruments themselves. Whereas a surgeon doing traditional laparoscopy may have restricted movement, the robotic instruments have much more freedom of motion.

"These instruments are multi-directional and wristed, so they can perform very fine dissection," Harkins said. "All these elements come together to allow us to work on more advanced instances of the disease."

Patel agreed, saying she has also seen exceptional results stemming from the robot's specialized instruments.

"Ergonomically, the entire process is better," she said. "The visualization is so much greater with the high definition, 3-D camera. If you can see better, you can do better. With traditional [laparoscopy](#), the instruments can be difficult to control. You end up having to contort your body to get the right angles, but with the robotic controls you have much more precision."

Moving forward, Harkins believes robotic surgery will continue to surge in popularity and evolve into an area of specialization for surgeons. He envisions centers of excellence cropping up where patients can be referred to the best robotic surgeons. To help accomplish this, he hopes participants in Penn State Hershey's fellowship and residency programs will use the knowledge and skills they gain to migrate [robotic surgery](#) to other institutions.

"The robot's immense potential for surgical needs is here to stay. Once more people see these advances in surgical technology, it's going to become more and more the surgical norm. No patient would want to go backwards," Harkins observed. "The goal is that every patient will be offered a minimally invasive approach to their surgery."

Provided by Pennsylvania State University

Citation: Da Vinci's robot: Surgery is getting a renaissance (2013, April 25) retrieved 24 April 2024 from <https://medicalxpress.com/news/2013-04-da-vinci-robot-surgery-renaissance.html>

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