Robot refines surgical precision

HEALTH CARE: Duluth urologists begin using a four-armed robot that promises less pain and shorter hospital stays for patients who have surgery.

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The lead surgeon at a Duluth hospital hardly went near his patient Wednesday throughout a lengthy, demanding operation.

In fact, he sat across the room.

There, from his seat at a large console, Dr. Karl Kimberling snipped, sewed and trimmed a tube joining the patient’s kidney and bladder by controlling the four slender, piston-like arms of a $1.2 million robot inserted into her abdomen via half-inch-long cuts.

It was the third such surgery performed by either Kimberling or Dr. Martin Grune, two St. Mary’s/Duluth Clinic urology surgeons trained to use an expensive and novel medical robot. The Duluth hospital bought the device in May and joined a growing number of hospitals making a costly investment in new, sophisticated technology for an uncertain return.

Since 2001, when the U.S. Food and Drug Administration approved Intuitive Surgical’s "da Vinci" robot for surgical use, research...
studies have explored its advantages, limits and benefits to patients.

Among its drawbacks: When first learning to use the device, doctors keep patients in surgery several hours longer than during conventional procedures.

But in studies on the removal of prostate glands, cancer patients lose less blood, leave the hospital faster and suffer less pain in robot-assisted surgery than when doctors cut patients open by hand.

That's a nearly identical result, however, to prostate removals done with hand-held mechanical "arms," a technique called laparoscopy. Which begs the question: Why use a $1.2 million robotic platform?

**VISION, PRECISION**

One reason is that surgeons performing laparoscopy must insert a camera inside the patient. That's also true for robot-aided prostate surgery, but da Vinci's camera is 3-D and magnifies images 10 times, Kimberling said.

And the robot's arms are far more adroit. Da Vinci arms rotate 360 degrees and can angle instruments such as needles or tweezer-like forceps on pin-sized pivots, Grune said. The flex more closely resembles the natural movement of a wrist, he said.

When possible, surgeons prefer using a mechanical arm -- hand-held or robotic -- because that minimally invasive surgery does not require long incisions to get at organs or tissue beneath the skin.

Proponents say da Vinci's advantages over hand-held minimally invasive surgical instruments allow urologists to be more precise as they maneuver around delicate nerves and blood vessels, hone in on tumors or defects inside the pelvis.

There is no long-term data yet on whether minimally invasive robot-aided surgery will be more effective than alternatives at preventing a resurgence of cancer or side-effects from prostate surgery, such as incontinence and impotence.

Because robot-aided surgeries are relatively recent, that data is not yet available.

"I think that it may be a little premature to boast any superiority over any other established techniques," said Dr. Matthew Gettman, a Mayo Clinic College of Medicine assistant professor of urology.

The Mayo Clinic and the University of Minnesota Twin Cities also own da Vinci robots.

But short-term results of robot-aided surgery -- quick recovery, less blood loss, less pain and shorter hospital stays -- all benefit the patient, he said.

"Robots are tools, they are not surgeons," explained Dan Stoianovici, an associate professor of urology and mechanical engineering and director of medical robotics at Johns Hopkins University School of Medicine. He said the da Vinci improves surgeons' precision and provides a more accurate, clearly defined image. "It's a better tool."

Stoianovici expects that research in coming years will bear out medical robots as worthwhile investments.
"Many of the medical improvements have been achieved through medical technology," he said. "You're paying a million dollars for it. The question is: Does it make you a better surgeon? The answer is yes."

WHOVILLE

Despite the cost, insurers don't pay any more for a robot-aided surgery than they do for a hand-held laparoscopic operation, said Dr. James Peabody, a senior urologist at the Henry Ford System's Vattikuti Urology Institute. Hospitals must absorb the additional cost.

Surgeons at Henry Ford were among the first U.S. physicians to use the da Vinci and have performed more than 1,000 prostate surgeries with the robot. They learned that doctors also have a learning curve that initially slows operations by hours. As surgeons gain experience, operations take less time, said Peabody, who has done at least 200 robot-aided operations.

Kimberling and Grune traveled to Hackensack, N.J., for training and practice on animals and cadavers.

Doctors experienced with the robot have monitored the Duluth doctors' first surgeries, which six hours -- about three hours longer than standard procedures.

Kimberling and Grune practice on the device, threading needles through hoops or hooking rubber bands on tiny cones. Kimberling dubbed one of the funky miniature obstacle courses after a Dr. Seuss creation, "Whoville."

Practice helps the physicians adjust to robot surgery. "You're missing one of your senses," Grune said.


During surgery, one stands at the operating table to assist using two additional hand-held mechanical arms. The other directs the robot's movement remotely.

From a nearby console, a surgeon can move and focus a 3-D image and guide the robot's arm moving his fingers, hands and wrists inside wired hand-braces.