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Robot-Assisted Prostate Surgery Has Possible Benefits, Higher Costs

By Lisa Esposito, Editor Health
Behavior News Service

Although minimally invasive prostate removal aided by a robot can lead to less blood loss, shorter hospital stays and fewer complications, there is no evidence that the procedure improves cure rates, according to a new technology assessment.

In addition, robotic surgery, in high demand among patients, can lose money for hospitals because of its expense and special training required, according to the new review of studies by ECRI.

ECRI is a nonprofit health services research agency that produces systematic evidence reviews on medical devices, drugs, biotechnologies, procedures and behavioral health services.

The review of 625 cases looks at two studies that compared the three procedures available to patients: traditional open surgery, laparoscopic (also known as minimally invasive) surgery and robotic-assisted laparoscopic surgery.

In the review, average blood loss was significantly lower for patients who underwent either of the two minimally invasive procedures: less than 150 ml for robotic-assisted and 382 ml for non-robotic, while the average blood loss for open radical surgery in the two studies was 418 ml and 910 ml.

Cancer cure rate, measured by presence of cancerous cells at the surface of the removed prostate, and by PSA levels following surgery, was nearly identical for all three procedures.

Hospital stay was significantly shorter with robotic-assisted prostatectomy compared to open surgery in both studies, 25.9 hours versus 52.8 hours in one study.

One study reported significant difference in catheterization time: 7 days for robotic-assisted patients, 7.9 days for non-robotic laparoscopy patients and 15.8 days for open surgery patients.

Open prostatectomy had a significantly higher overall complication rate of 15 percent, while non-robotic laparoscopic prostatectomy had a rate of 10 percent and robotic-assisted had a complication rate of 5 percent.

Prostate cancer patients' biggest concerns — after cure — are the possible side effects of surgery, including urinary incontinence and sexual impotency. Data on these side effects from robotically assisted prostatectomy were sketchy at best, and no evidence was available to indicate that any surgical method emerged as better than another for these side effects.

So far, patient demand, not evidence, is the driving force behind the rise in robotic-assisted prostatectomy, according to report co-author Diane Robertson, director of Health Technology Assessment Services for ECRI.

Robertson says that the concept of minimally invasive surgery is highly attractive to patients, with many willing to travel for the robotic procedure, but she cautions that patients should choose based on surgeon experience and evidence on efficacy rather than just picking the latest technology.

"If you have to choose between someone who hasn't performed many robotic surgeries and a person who has performed many open procedures — take the open procedure," says Peter G. Schulam, M.D., Ph.D., a urology professor at the David Geffen School of Medicine at UCLA.

Schulam routinely performs non-robotic laparoscopy, the more technically difficult of the minimally invasive surgeries.

Michael Esposito, M.D., a surgeon in Hackensack, NJ., who has performed about 425 robot-assisted surgeries, explains, "Robotics is a modification tool that further refines laparoscopy." Esposito says that robotics offers a three-dimensional view with much greater clarity, made possible with a binocular telescope held by one of the robotic arms.

Robotics allows surgeons to work seated at a console a few feet away from the operating table, pushing a joystick and pressing foot controls to remotely manipulate the three robotic arms at the bedside.

One arm positions a high-resolution camera, while the other two arms control the surgical instruments. "Robotic [hands] are wristed instrument that can open, close, flex and rotate 170 degrees," Esposito says. "They're so small and

meticulous that you can scale movements and do extremely fine work."

Robotics is meant to eliminate hand tremors, but some surgeons find the lack of contact with instruments disconcerting. Esposito says that, once experienced with robotics, "your vision becomes a surrogate for tactile feedback."

Schulam says that both forms of minimally invasive surgery lead to shorter recovery and less pain "because there's no stretching of muscle, and possibly, less blood loss." Also, "patients prefer the five smaller holes over a larger midline incision."

Cost was the one area in which the older open surgery was the clear winner: Open radical prostatectomy costs \$487 less a case than non-robotic laparoscopy and \$1,726 less than robot-assisted prostatectomy.

According to the review, "Shorter operative time and decreased hospital stays associated with the robotic procedure did not make up for the cost of the additional equipment expenditure." Estimated costs of the robotic system to a provider run about \$1.2 million a year, with maintenance costs of \$120,000 a year and one-time costs of \$1,500 a case.

"Hospitals have to consider whether they can use the system for more than one type of procedure to make it worth the capital equipment investment, if the institute can use it for many applications," says Robertson. She adds that many operating rooms are not big enough to accommodate the robotic system.