A new study comparing the safety and efficacy of open surgery to minimally invasive laparoscopic surgery for gastric cancer showed that patients had similar rates of recurrence-free survival at 3 years. But there were statistically significant reductions in pain and late complications among patients who had laparoscopy and a trend toward more early complications in open surgery.

Most important, with laparoscopy, surgeons removed not only all the cancer but also a median of 18 lymph nodes, according to Vivian Strong, M.D., lead author and attending surgeon at Memorial Sloan-Kettering Cancer Center in New York. This finding addressed one of the many questions that still surround minimally invasive surgery (MIS): whether it is possible to remove enough lymph nodes to accurately stage the cancer.

Strong’s study, published in April in the *Annals of Surgical Oncology*, is one of many comparing outcomes of minimally invasive and open surgery for lung, kidney, esophageal, bladder, prostate, and colorectal cancer. The data are welcome, say experts who worry that although MIS is clearly on the rise, few studies have weighed outcomes.

“Too be justified, minimally invasive surgery should have equal or better outcomes than open surgery and improve quality of life,” said Duke University thoracic surgeon Thomas D’Amico, M.D., who discussed gaps in knowledge about MIS at the National Comprehensive Cancer Network’s annual meeting in March.

D’Amico, a consultant to Scanlan Instruments, which produces MIS instruments, and member of the speaker’s bureau for Covidien, a health care products company, called himself a big proponent and practitioner of MIS. But he emphasized that there is a lack of evidence-based data on its superiority. This is particularly true for the newest variation of MIS, robotic surgery. “If you Google ‘robotic surgery,’ you will find a lot of marketing but not much evidence of its superiority to laparoscopic surgery,” D’Amico said. The uptake of MIS, including robotic surgery, may be driven more by marketing frenzy than by efficacy, he said.

Monica Morrow, M.D., chief of the breast service at Memorial Sloan–Kettering Cancer Center, agreed: “We need to ensure that the quality of cancer treatment is equivalent to or better than with open surgery and that we’re not getting rid of treatments that work in favor of what’s trendy.”

Nevertheless, proponents of laparoscopic surgery cite faster recovery and less pain, and fans of robotic surgery find certain advantages for the surgeon. “Robotic surgery offers 12-fold, 3-dimensional magnification; a better range of motion, or ‘wristedness,’ rather than just up-and-down motion of laparoscopic procedures; and advantages in procedures [that] require surgical reconstruction,” said Ash Tewari, M.D., director of robotic surgery at New York-Presbyterian Hospital. Others, such as Bertrand Guillonneau, M.D., attending surgeon at Memorial Sloan–Kettering Cancer Center, and D’Amico maintain that such tools are not necessary for experienced surgeons, and still others see advantages and disadvantages to both systems.

“You could teach a 6-year-old to sew a urethra to a bladder robotically.”

New studies, which compare laparoscopic to open, laparoscopic to robotic, and robotic to open surgery may help resolve some of the questions surrounding MIS.

**Strongest Evidence**

The strongest case for MIS exists for colorectal cancer, with four to five prospective randomized trials, D’Amico said. The results of a 7-year study with 872 colorectal cancer patients, published in 2003 in the *New England Journal of Medicine*, helped ease concerns that MIS was associated with higher recurrence rates. This randomized prospective study found similar recurrence, complications, and 3-year survival rates but shorter hospitalization and reduced need for pain medication in MIS. Most other trials have shown similar survival and recurrence rates but less pain, fewer days in hospital, and faster recovery for MIS.

Other research has given rise to the hypothesis that MIS in colorectal cancer may even help reduce recurrence through its effect on levels of vascular endothelial growth factor (VEGF). Typically, high levels of VEGF are present in conditions of wound healing, such as after surgery; levels are also higher in many cancers, where VEGF promotes the growth of blood vessels feeding the tumor. The hypothesis is that reduced VEGF levels, resulting from smaller incisions, could translate into slower tumor growth. Richard Whelan, M.D., professor of...
surgery at New York’s Columbia University and a proponent of this theory, has measured levels of VEGF in patients receiving open or laparoscopic surgery before and after surgery. He found that before surgery, colorectal cancer patients had higher baseline VEGF levels than those without tumors, and that after surgery, the MIS patients had lower VEGF levels than the open surgery patients.

New studies in other cancers support the idea that MIS has fewer side effects and complications and has no adverse effects on recurrence. In May, at the American Association for Thoracic Surgery meeting in Boston, D’Amico presented a retrospective study comparing open and MIS for lung cancer in 6,434 patients. The MIS patients had fewer postoperative complications such as cardiac arrhythmia, pneumonia, blood transfusions, and reintubation. Their hospital time was 1 day shorter and their drainage tubes were removed sooner. “With MIS, patients have less pain so it’s easier to breathe and consequently, they have better preservation of lung function,” D’Amico said, and this may have advantages for adjuvant therapy. “You start with a stronger patient, who can have adjuvant chemotherapy sooner, and more of it.”

For bladder cancer, Weill Cornell Medical College’s Douglas Scherr, M.D., discussed the advantages of robotic-assisted bladder removal over open surgery at the April 2009 American Urological Association meeting in Chicago. “We saw fewer postoperative complications with robotic surgery and equivalent outcomes at 30 and 90 days,” he said. Robotic surgery took the same amount of time as open surgery and reduced blood loss, the need for transfusions, and length of hospital stay.

**Prostate Cancer**
In prostate cancer, a debate simmers over the advantages of laparoscopic versus robotic surgery. Proponents of robotic surgery, Scherr and Tewari, maintain that outcomes are as good as if not better than those of laparoscopic surgery because microscopic enhancement of tissues enables surgeons to avoid cutting through nerve bundles, which translates into superior continence and potency outcomes. But Guillonneau, a pioneer of laparoscopic prostatectomy, said that there is no long-term evidence that cure rates, continence, and sexual function differ among the three types of prostatectomy.

In a recent review of 37 studies, including one randomized controlled trial comparing the three types of surgery, Guillonneau found that laparoscopic and robotic surgeries took longer than open surgery, especially early in a surgeon’s learning curve. But differences in blood loss, transfusion rates, catheterization and hospitalization times, and complication rates favored laparoscopic over open surgery, according to this review, published in January in *European Urology*. Functionally, results for laparoscopic and open surgery were similar, except in the randomized controlled trial, in which recovery of continence and potency was superior after robot-assisted surgery compared with open surgery.

Surgical experience is associated with better outcomes in both open and laparoscopic surgery. In a new retrospective, international study of 4,702 patients, published in April in *Lancet Oncology*, Guillonneau found that more surgical experience was associated with reduced risk of recurrence for laparoscopic prostatectomies. An unexpected finding was that the learning curve for laparoscopic prostatectomy was much slower than that reported for open procedures and that improvements in outcomes accrued more slowly for laparoscopic than for open surgery. “Surgeons experienced in open prostatectomy had significantly poorer results than those whose first operation was laparoscopic, an indication that surgeons should not switch back and forth,” Guillonneau said. “Laparoscopic radical prostatectomy seems to involve skills that do not translate well from open surgery.”

But Nasser Altorki, M.D., a cardiothoracic surgeon at Weill Cornell Medical College, disagrees that experience with open surgeries affects the learning curve in MIS procedures. And he argues that knowing both procedures is an advantage. “As a surgeon, I don’t want to have one instrument in my toolbox; I want many,” he said.