A Revolution in Surgery

That’s Minimizing Everything but Results

By Lynda Rudolph

PHOTOS BY JOHN EMERSON
Traditional “open” surgery is going the way of the dinosaur. Heart valve repairs, brain tumor resections, and other complex procedures that were formerly the territory of open surgery are now being performed using minimally invasive surgery, or MIS. The buzz about it is everywhere: on the lips and in the minds of not just clinicians but patients as well. Even advocates of health care reform love it.

The benefits are substantial. Shorter hospital stays. Less pain. Fewer and smaller incisions. Less scarring. Reduced blood loss. Faster healing and recovery. For physicians, it’s a new frontier — one that offers better access to human anatomy. For patients, it’s a revelation — in some cases, cutting recovery time in half. For watchdogs of operational costs, it’s a panacea — the numbers of procedures are up; readmissions and complications are down.

It seems as though we went overnight from nine-inch incisions to those that are barely visible to the human eye. But when and where did the MIS revolution actually begin?

Where It All Started

The origins of minimally invasive surgery date back more than 200 years, to the same year when Thomas Jefferson was reelected president. In 1804, a device called the Lichtleiter (light conductor) was introduced in Frankfurt, Germany, by Philipp Bozzini. It was a light-guided instrument that served as a primitive endoscope. But it wasn’t until 1981 that the first laparoscopic appendectomy was performed by Kurt Semm, a pioneer of modern laparoscopic surgery. Today, the number of minimally invasive surgical applications is mind-boggling.

“Twenty years ago, there was very little minimally invasive surgery being performed. Today, the majority of surgeries have some minimally invasive or remote access application,” says Alan M. Graham, MD, professor and interim chair, Department of Surgery, chief, vascular surgery at Robert Wood Johnson University Hospital (RWJUH), and medical director for clinical practice operations and planning, Robert Wood Johnson Medical Group.

MIS Applications Are Burgeoning Locally

Adrian Balica, MD, assistant professor of obstetrics, gynecology, and reproductive sciences and director, Minimally Invasive Gynecologic Surgery Program, is using minimally invasive procedures for women who suffer from gynecologic conditions. Single port laparoscopic surgery (SILS) for hysterectomy, ovarian cystectomy, and uterine conservation procedures, such as endometrial ablation, using radio frequency are commonplace. “Robotic surgery is a new tool we’ve added,” says Dr. Balica. “With the magnification built into the robotic technology, I can actually see capillaries that aren’t visible to the naked eye.”

In the case of rectal surgeries, unlike the national trend, in which only 10 percent are done using minimally invasive methods, surgeons at RWJUH are using robotic surgery for the rectum in nearly half the cases, with significant success. Since the need for large incisions is eliminated, nerve damage that affects bladder function is avoided, so outcomes for patients are much improved over those following open surgery.

Along with rectal robotic surgical expertise, Craig Rezac, MD, assistant professor of surgery and director, Colorectal Surgery Program, is one of
Craig Rezac, MD, assistant professor of surgery and director, Colorectal Surgery Program, is one of the pioneers of transanal endoscopic microsurgery. He performed the first procedure in the state four years ago and is developing the Robotic Colorectal Surgery Program at RWJMS and RWJUH. The TEM procedure is a minimally invasive approach that provides magnified vision and superior optics for removing tumors throughout the rectum, allowing surgeons to take out rectal lesions that would have been considered inoperable.

Isaac Yi Kim, MD, PhD, associate professor of surgery and chief, section of urologic oncology, at The Cancer Institute of New Jersey, completed his 1,000th robotic prostatectomy in October 2012. Dr. Kim developed a new approach known as the athermal intrafascial robotic (AIR) prostatectomy. This radically different way to enter the tissue planes — around the prostate rather than through the endopelvic fascia — has resulted in reduced trauma to the nerves that control erections.

Gamma Knife Perfexion is currently being used for brain cancer and to treat arteriovenous malformation (AVM), pain disorders, and tremor. Gamma Knife Perfexion is the specialty of
Dr. Danish and his team are using lasers to treat brain tumors that have been inoperable with traditional surgical methods. They also use it to treat epilepsy. Having recently reached the 50-procedure milestone, they perform more of these types of laser procedures than anyone else in the country. Laser ablation has been used on other parts of the anatomy for years, but it has been employed to treat epilepsy only since 2010.

In the procedure, surgeons thread a fiber-optic cable through a small hole in the skull and, using image guidance, carefully maneuver it to where the brain lesion is located. Then they initiate the laser ablation to burn out the targeted tissue that is at the origination point of the epilepsy. “I think laser procedures are going to revolutionize epilepsy treatment, because we can achieve the same outcomes without opening the head,” says Dr. Danish.

The implantation of deep brain stimulation (DBS) devices to treat movement disorders is another way in which MIS has transformed neurosurgery. These devices deliver electrical pulses to stimulate the brain, targeting specific areas that will result in better control of the disabling
movements of Parkinson’s disease and similar conditions.

We may currently seem to take this revolution for granted. But, as Dr. Danish points out, “Five years ago, some of this technology didn’t exist.”

“The trend is moving toward minimally invasive,” says Dr. Graham. “The technology is evolving, and remarkable results are possible.”

“Just look at the numbers,” adds Dr. Kim. “They are rising dramatically each year.”

But the future is about more than increasing numbers of existing MIS procedures. It’s also about innovations. “Within the next year, we expect to see single port laparoscopic surgery, using a new robotic device, which means only one small incision will be needed,” says Dr. Kim. There’s a new application for partial nephrectomies as well, which involves injecting dye into the kidney to determine where the cancer is located, effectively “staining” the cancer cell. The fluorescent-dyed tumor lights up, providing a real-time assessment to reduce the likelihood of leaving any cancerous tissue behind.

Minimally Invasive Surgery as a Major Attraction

MIS training and education are required as part of the curriculum qualifications for residents. In 2005, the Residency Review Committee of the Accreditation Council for Graduate Medical Education revised the laparoscopic and endoscopic minimum case requirements for graduates of surgical residencies. These requirements include 60 basic laparoscopic surgeries, 25 advanced laparoscopic surgeries, 35 upper endoscopies, and 50 colonoscopies.

“Medical residents are now looking for programs that can provide the kind of procedural experience they need,” says Dr. Rezac. “There are minimum requirements for procedures needed for residents to sit for their boards.”

Becoming a leader in the operating room affects physician recruitment as well. “The dynamic physicians we’re after are looking for a state-of-the-art environment,” says Dr. Graham.

And patients are coming into physicians’ offices armed with their own research that they’ve done on the Internet. “They come in with a list of what they’re looking for,” says Dr. Graham. “They’re going to go somewhere else if we don’t have it.”

MIS has become so essential to medical practice that complete centers are being established around it. “We feel it’s so critical to patient care that we are establishing a Minimally Invasive Center at RWJMS and RWJUH,” says Dr. Graham. The center — already robust and newsworthy — will invite all the specialties to be housed under one virtual roof. “This brings together our extensive collective of resources, creating a central hub of information and innovation people in New Jersey can turn to,” Dr. Graham concludes.

MIS is just the beginning of how surgery is being reinvented. It not only sets the bar for procedural innovations in place today; it holds the promise of things to come.