

Special REPORT

Technology Solutions For General Surgery

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Discussing a Portfolio of Innovative Products: SAGES 2022

At the 2022 meeting of the Society of American Gastrointestinal and Endoscopic Surgeons in Denver, Colorado, 4 faculty surgeons under the leadership of

Marina Kurian, MD, FACS, FASMBS, a clinical professor in the Department of Surgery at the NYU Grossman School of Medicine, participated in a live educational session about how the exciting new technology portfolio from Medtronic has impacted workflow at their practices. "Each of the speakers has significant experience with these new technologies and was the best to address their nuances, particularly how they use the technologies in different situations," said Dr Kurian. "I have used Medtronic stapling and other products since fellowship, and I appreciate how the technology addresses the needs of surgeons."

EleVision™ 4K+ Platform With TipVision™ Videoscope^a

The full EleVision™ 4K+ platform provides crisp, vibrant color resolution and a clear image,^{1,b,c} and the camera's optical zoom feature enables a full-screen 4K image without the degradation caused by digital zoom.^d In addition, the TipVision™ videoscope (Figure 1) dual chip-on-tip technology generates light at the surgical site and captures information directly at the source.^e

With a camera that features digital smoke reduction image processing and light-emitting diode (LED) lights on the TipVision™ videoscope, the EleVision™ 4K+ platform supports an uninterrupted image, saving valuable operating room (OR) time. "We did a case that required a lot of cautery, and usually there is a lot of smoke. Not once did I have to remove the camera from the patient and wipe it. We worked uninterrupted for 2 hours, which is pretty amazing," said Francisco Quinteros, MD, FACS, FASCRS, a colorectal surgeon at the Chicago Institute of Advanced Surgery and chairman of surgery at Thorek Memorial Hospital, in Illinois.

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The TipVision™ videoscope includes instant, automatic, focus-free technology.^f Supported by a broad depth of field,^{1,g} it improves surgical continuity by decreasing the intraoperative disruptions caused by lens fogging and loss of optical focus, which may enable more efficiency in the OR.^{2,c,h} “It’s very responsive,” said Dr Quinteros. “I’ve used other systems in the past that had autofocus, and they were either sluggish or you had to hit a button, but this is automatic. This is my preferred visualization system.”

The EleVision™ 4K+ With TipVision™ videoscope is a simple, elegant, and intuitive platform that requires little training, so surgical teams can work efficiently.^{3,i} In addition, TipVision™ videoscope has a streamlined design without separate light or camera cords. “Any little bit you can do to reduce clutter in the OR is helpful,” said Dr Quinteros. “There’s still a cable, but it’s better than 2.”

The EleVision™ IR Platform^a

“EleVision™ IR takes an old technology—immunofluorescence with ICG [indocyanine green]—and maximizes it,” said



Figure 1. TipVision™ videoscope.



Figure 2. EleVision™ IR imaging modes: visible light (left), green overlay (middle), and IR image showing fluorescence (right).

Advances in ICG fluorescence technology demonstrate multiple imaging options during laparoscopic surgery. Traditional white light laparoscopy can be augmented with overlaying fluorescent arteriograms and images of tissue perfusion onto white light images.

ICG, indocyanine green; **IR**, infrared.

Photos courtesy of Helmuth Billy, MD, FASMBS.

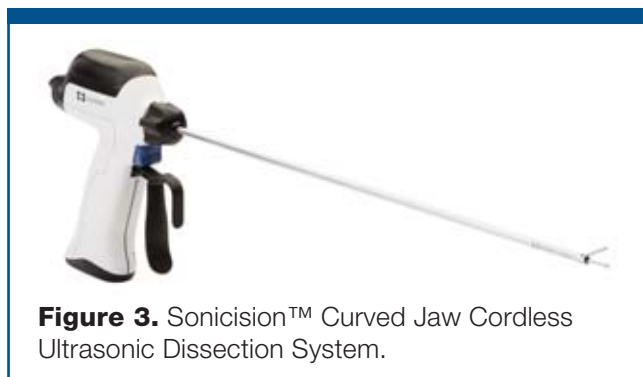


Figure 3. Sonicision™ Curved Jaw Cordless Ultrasonic Dissection System.

Helmuth Billy, MD, FASMBS, a bariatric surgeon at Ventura Advanced Surgical Associates in Ventura, California. The technology provides real-time qualitative and quantitative infrared (IR) fluorescence imaging by measuring the relative fluorescence signal intensity to help surgeons visually assess perfusion and blood flow in both open and minimally invasive surgeries.^{4,5,j} Dr Billy was quick to note this advantage: “As our procedures have become more sophisticated, ongoing evaluation of the vascular system has become more important, such as looking at blood supply to tissues that were partially devascularized. EleVision™ IR shows me the blood supply in real time, so I can see white light at the same time I’m seeing vascular arterial imaging, where the blood flow is actually going. It’s something we’ve never had before,” he said.

The EleVision™ IR platform open camera system creates a uniform edge-to-edge illumination pattern, resulting in a sharp peripheral image.^{4,j} In addition, the system uses 2 image sensors to produce simultaneous white light and IR fluorescence images, and merges them in real time. These imaging modes (visible light, green overlay, IR image showing fluorescence), available in both open and laparoscopic procedures, support novel applications in clinical practice (Figure 2). In the past, according to Dr Billy, surgeons using immunofluorescence often could not operate while visualizing the immunofluorescence or had to operate in the dark. “The big explosion for my practice came when EleVision™ IR showed up because of the white light overlay. Now, I can operate at the same time there is ICG in the system. I can see green on top of a brilliant, beautiful, high-definition, endoscopic view,” he said. “Before that, everything turned black and we waited for the ICG to light up the field.” With the overlay, the OR lights can stay on when using the system for open procedures, allowing continuous visibility of the operative field.⁵

The Sonicision™ Curved Jaw Cordless Ultrasonic Dissection System

Dr Billy thinks the cordless design of the Sonicision™ curved jaw device (Figure 3) improves freedom of movement and mobility in the OR.^{6,k} “The introduction of the Harmonic® scalpel was beneficial, but the delivery system was cumbersome,” he said. “The nice thing about the Sonicision™ device is you are no longer tethered to a generator. You don’t have cords, which can tangle.⁷ The cordless design means a safer OR.”⁸ Also, the Sonicision™ curved jaw device has an auto-washable and autoclavable generator to streamline cleaning and sterilization. “Effectiveness is maximized with this technology,”⁷ said Dr Billy.

The 13-cm Sonicision™ tapered, curved jaw device enables a more natural wrist position^{6,l} and greater visibility of the surgical field than a hemostat-style design.^{6,m} In addition, the Sonicision™ device has a thinner active blade than the Harmonic ACE®+7 device.^{9,n} The jaw design allows for precise access to tissue planes.^{6,o} It allows surgeons to hug curved anatomic structures^{6,p} and provides access in tight spaces.^{6,q} The dual-mode, single-button energy activation feature is intuitive to use,^{6,q} and is designed to improve focus^{6,r} and keep the surgeon’s eyes on the operating field.^{6,p} Dr Billy prefers the Sonicision™ device to electrocautery and the Harmonic® scalpel. “The more the surgeon can control, the better the experience for the patient and the operating crew,” said Dr Billy. “You don’t have to remove and replace the instrument to achieve a dissection as with traditional dissectors. You can do the entire dissection, isolate a vessel, then ligate it with 1 instrument.”

The Signia™ Stapling System

The Signia™ stapling system measures forces on tissue in real time and provides audible and visual feedback when used with any reload with Tri-Staple™ technology.^{10-12,c} In fact, reloads with Tri-Staple™ technology can be used on a wide range of tissue thicknesses due to the graduated compression profile,^{13-17,c,j,s} reducing stress on tissue^{16,18,t,u} while delivering superior staple line strength for leak resistance.^{13,19,j,v} An LED screen easily visible in the stapler handle identifies zones based on clamp force measurement (1, the lowest, to zones 2 and 3).^{20,c} Visual cues show that the firing speed automatically adapts based on an elevated compression force reading,^{10,11,c} slowing with higher forces. “I like when it slows because I know that will optimize staple formation in thicker tissue,”^{20,c} said Tae Kim, MD, FACS, FASCRS, a colorectal surgeon at Intermountain Healthcare in Salt Lake City, Utah.

The tissue sensing function of the Signia™ stapler (Figure 4) correlates with the tactile feedback a surgeon would get with a manual stapler.^{21,w} The real-time feedback of the Signia™ device allows surgeons to make an informed decision about their staple load selection^{21,j} and, according to Dr Kim, helps trainees avoid mistakes. “I love the Signia™ stapler for teaching,” he said.

Dr Kim likes the adaptive firing speed of the Signia™ device over single-speed staplers for consistently providing B-shaped staples^{11,22,23,c,x} for a more secure staple line.^{11,22,23,c,x} In addition, he prefers the Signia™ stapler for the performance of low pelvic procedures. “I can put a trusted product deeper into the pelvis and it gives me real-time feedback with a stronger staple line.”^{24,c,y} I use the Signia™ device for all my stapling needs,” he said.

The GoFurther™ Patient Engagement App From Medtronic and Virtual Health Partners

Bariatric surgeons now have a tool that may improve patient retention.²⁵ The GoFurther™ digital application features a desktop-based, practice-facing dashboard and patient smartphone application (Figure 5) with a customizable online patient tracking system, including a virtual weight management option. “The enrollment process is easy,” said Lucian Panait, MD, MBA, FACS, a general surgeon at Bhatti Weight Loss in Chaska, Minnesota. “Patients receive an email with a link to download the app, then our practice populates the list with the required dietitian and psychology appointments, preoperative tests, etc. Patients receive instant feedback and can see the exact percentage of tasks they’ve completed. They have it all at their fingertips. The app keeps patients more engaged in the process.”²⁶

Supporting patient compliance and satisfaction is essential, considering that fewer than 30% of patients attend their post-operative nutrition appointment.²⁷ In fact, many patients—before and after surgery—do not adhere to prescribed weight loss and exercise regimens,²⁷ so Dr Panait sees an opportunity with the GoFurther™ patient engagement app to increase patient compliance, a prospect supported by emerging data.²⁸ From 2016 to 2019, investigators evaluated an alternative digital application by following 79 patients who received endoscopic bariatric therapy at the University of Colorado to determine compliance rates for monthly visits with a registered dietitian.²⁸ Traditional visits (in-office or telephone) were replaced with mobile app virtual visits in August 2018. The compliance rate for patients who only attended the virtual visits (49.8%) was significantly higher than for

patients who only attended traditional visits (16%; $P=0.0002$).²⁸

Dr Panait emphasized how the GoFurther™ app simplifies and streamlines pre- and postoperative care,²⁹ reducing the burden on supporting staff. “We look at the dashboard and can see the same thing as patients,” he said. “We see, very quickly, what is left for them to do. We don’t need to go through mountains of paperwork looking for an appointment that may or may not have been done.” In addition, the app can create a real cost-saving opportunity for providers.³⁰ Implementation of the GoFurther™ app saved one health system more than \$30,000 annually.³⁰

The monthly fee for the GoFurther™ app is \$4 per individual and Dr Panait absorbs that cost instead of passing it on to his patients. “In our practice, we use the GoFurther™ app

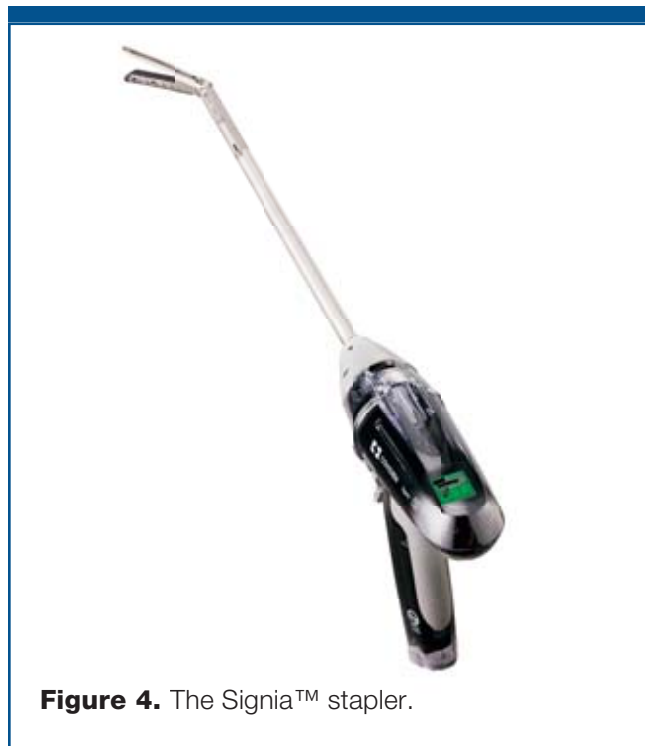


Figure 4. The Signia™ stapler.

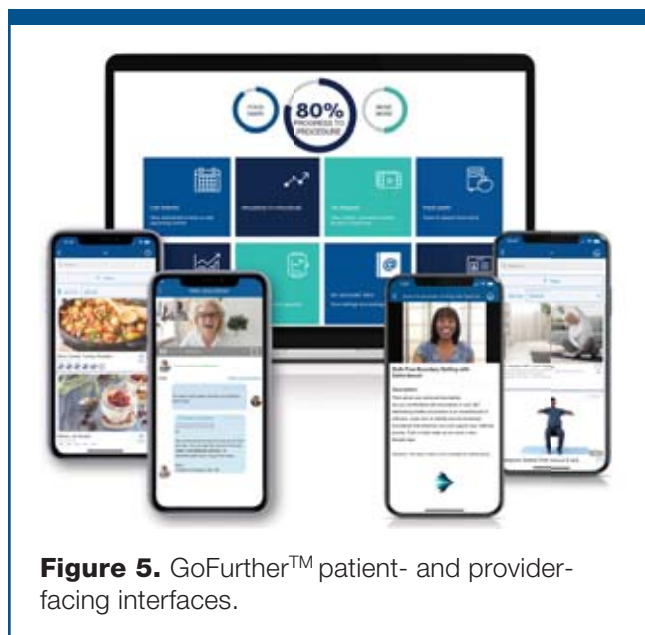


Figure 5. GoFurther™ patient- and provider-facing interfaces.

for both insurance and self-pay patients,” he said. “We don’t employ a dietician and psychologist. So, for self-pay patients, we pay a little more for the app-based dietary education and psychology evaluations. It ends up being around \$200 for the package. Patients put their health at risk when going through an operation. We want to be sure they are successful.”

Conclusion

This innovative technology portfolio from Medtronic is designed to support clinicians. Dr Kurian encourages her peers to try these exciting new tools, which are available to physicians today. “I think they’d find these Medtronic technologies helpful for overall ease of use and the streamlining of operative processes,” she said.

Footnotes

- ^a The EleVision™ 4K+ platform with TipVision™ videoscope and the EleVision™ IR platform are no longer commercially available in the United States.
- ^b Preclinical evaluation: 17 surgeons rated the performance of image color and sharpness at 80% and 91%, respectively.
- ^c Based on preclinical or animal studies. Results may not correlate with performance in humans.
- ^d Full-screen image achieved through optical zoom instead of digital zoom.
- ^e Dual chip-on-tip technology consists of a distally located CMOS sensor and integrated LED lights.
- ^f TipVision™ videoscope has a fixed depth of field of 20 to 200 mm with the most optimal image between 30 and 60 mm.
- ^g Measurement taken at 10 mm intervals from 20 mm to 80 mm with the focus point set at 40 mm on a 1951 USAF resolution test chart. Resolution decreased an average of 52% for the Olympus Visera™ 4K and 18% for the EleVision™ 4K system, respectively.
- ^h During a laparoscopic transabdominal inguinal hernia repair and laparoscopic cholecystectomy, TipVision™ videoscope reduced total procedure time by 16% and 10%, respectively compared with a traditional rod-lens laparoscope. Based on preclinical or animal studies (n=4 cases total).
- ⁱ Thirty-two out of 32 surgeons and nurses easily completed all pre-, intra-, and postoperative usability tasks prior to any training. Data based on usability of EleVision™ HD 2 platform. Industrial design and user experience of the EleVision™ 4K system are equivalent to the EleVision™ HD 2 platform.
- ^j Bench test results may not necessarily be indicative of clinical performance.
- ^k Twenty-nine out of 33 surgeons surveyed after use agreed.
- ^l Eight out of 13 surgeons surveyed after use agreed.
- ^m Ten out of 13 surgeons surveyed after use agreed.
- ⁿ Active blade measured at the tip and the base.
- ^o Thirty out of 33 surgeons surveyed after use agreed.
- ^p Thirty-one out of 32 surgeons surveyed after use agreed.
- ^q Thirty-three out of 33 surgeons surveyed after use agreed.
- ^r Seventeen out of 30 surgeons surveyed after use agreed.
- ^s Compared with Ethicon Echelon Flex™.
- ^t Compared with flat-faced cartridges with single-height staples.

- ^u Compared with Echelon Flex™ green reloads analysis of different stapler designs, performance, and impact on tissues under compression using 2-D finite element analysis.
- ^v Staple line strength: Endo GIA™ tan reload versus Echelon Flex™ white reload and Endo GIA™ purple reload versus Echelon™ green, gold, and blue reloads. In vitro synthetic leak resistance comparison: Endo GIA™ purple reload versus Echelon™ blue and gold reloads.
- ^w Bench test results may not necessarily be indicative of clinical performance ($P < 0.001$).
- ^x Compared with manual and fixed-speed powered staplers.
- ^y Compared with Ethicon™ powered stapler with GST technology.

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Disclosures: Dr Billy is a consultant to, has received honoraria from, and serves on the speakers bureau of Karl Storz, Lexington Medical, Medtronic, and Standard Bariatrics. He owns shares of GT Metabolic Solutions. Dr Kim is a paid consultant to Medtronic, and was compensated for his work on this project. The opinions expressed are those of Dr Kim, and are not indicative of any other party. Dr Kurian is an advisor to Medtronic and has received research or other financial support from Ezisurg Medical, Heron Therapeutics, and Vivus. Dr Panait is a consultant to Medtronic. Dr Quinteros is a consultant to Applied Medical, Medtronic, and THD America. He owns shares of Abbott and Medtronic.

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