

Portable Surgical Robot for Minimally Invasive Procedures: Interview with John Murphy, CEO of Virtual Incision

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Virtual Incision, a company based in Lincoln, Nebraska, has developed the miniaturized *in vivo* robotic assistant (MIRA) platform to perform minimally invasive abdominal surgeries, such as colon resections. Conceived as a small and accessible surgical robotic support device, the miniaturized system is considerably less expensive than current robotic surgical platforms.

MIRA is small enough to be easily transported and typically requires fewer incisions than larger and more complex surgical robots. The system can be inserted through a single midline umbilical incision in the abdomen. Strikingly, the device does not need specialized infrastructure or a dedicated room, and can even be used at a patient's bedside.

The folks at Virtual Incision hope that the device will increase the number of patients who can avail of minimally invasive surgeries. The company recently received an Investigation Device Exemption (IDE) from the FDA to allow it to pursue clinical studies at several US hospitals before pursuing regulatory approval.

See a video of the MIRA robot below:



Medgadget had the opportunity to talk to John Murphy, CEO of Virtual Incision about the MIRA.

Conn Hastings, Medgadget: *What challenges are holding back the broader adoption of robotically assisted surgery?*

John Murphy, Virtual Incision: It is widely accepted that minimally invasive surgery (MIS) is best for patients, resulting in a shorter length of stay, less pain, a faster recovery and reduced use of narcotics following surgery. While the pioneering work and growth in MIS surgical robotics over the last 20 years is impressive and inspiring, solving complexity and cost challenges will be key to much broader adoption over the coming decades, especially in settings such as community hospitals, ambulatory surgery centers and overseas.



Current mainframe platforms are not portable and can be difficult for hospitals to integrate – requiring a dedicated team specifically trained for robot-assisted surgery and renovations to accommodate the surgical platforms, which weigh hundreds or thousands of pounds, take up vast amounts of space, and cost millions of dollars. With the increasing demand for minimally invasive surgery, hospitals will be further encumbered by the cost and lack of flexibility, accessibility, and integrability of existing robotics platforms.

Medgadget: *Please give us an overview of the MIRA system and its features.*

John Murphy: The MIRA (“miniaturized *in vivo* robotic assistant”) Platform features a self-contained device that enables complex procedures to be performed with a MIS approach. It also includes an articulating scope that fits through the center channel of the device and two instrument arms. This design offers perfect triangulation between the camera and instruments, unobstructed visibility and eliminates the potential for collisions during surgery. The camera also has an instrument auto-track function, so that the working space is always in the field of view. The controllers filter out hand tremors and unintended movements during the procedure. The MIRA Platform was designed with ergonomics in mind, with input from surgeons who have used other robotic platforms.

Medgadget: *What procedures might the system be suitable for?*

John Murphy: MIRA is a simple, handheld device designed to enable complex multi-quadrant abdominal surgeries such as colon resections, with other potential laparoscopic applications. Colorectal and lower gastrointestinal procedures are the fastest growing procedures in the United States. There is a significant opportunity to increase the adoption of minimally invasive procedures for these patients by advancing the next-generation of robotic technologies – and thereby offering reduced recovery time, pain, blood loss, and overall complications. Virtual Incision is focused largely on the underserved 80%+ of the market where a smaller and simpler enabling solution is needed. Due to the limited number of platforms at hospitals, many patients have to wait several weeks

before having surgery. This is particularly problematic for patients diagnosed with gastrointestinal cancers and acute infections requiring emergency surgery. The MIRA Platform is designed to increase access to MIS for these patients and significantly reduce the time they have to wait for surgery, making it possible for surgeons to operate within days.

MIRA also reduces the number of incisions required for MIS colectomies. Until now, these procedures required four to six incisions, one of which is a large extraction site. MIRA simplifies this, reducing the number of incisions by 50% or more. With MIRA, complex colectomies can be performed through two incisions. This may help reduce the invasiveness of the procedure for the patient and simplify trocar placement, decreasing the learning curve associated with MIS procedures. MIRA is designed to rotate a full 360 degrees to work in multiple quadrants, making multi-quadrant general surgery procedures simpler and faster, potentially reducing the time a patient is under anesthesia.

Medgadget: *How will the system help to increase the number of patients who can avail of robotically-assisted surgery?*

John Murphy: Our vision for MIRA as a General Surgery platform is for it to be used in academic medical centers, community hospitals and ultimately, ambulatory surgery centers. With its minimal footprint, the platform could make MIS procedures an accessible, flexible option for all, promising to bring the benefits of MIS to more patients. By addressing complexity and cost challenges, we anticipate that the MIRA Platform will open up access to robotic surgery much more broadly. With a dedicated focus on making MIRA as simple and intuitive as possible, we also envision that the learning curve for performing MIS cases with MIRA be much less steep. Feedback we have received from robotic and laparoscopic surgeons has been that the platform is easy to pick up and use.



Medgadget: *How do you envisage that the system will typically be used? Is it possible to use it in a non-dedicated space and transport it easily?*

John Murphy: MIRA weighs just two pounds, is the about the size of a person's hand, and can be transported in a briefcase-sized surgical tray alongside a wheeled surgeon console that can easily be moved from room to room. With the simple, intuitive approach of MIRA, set-up is designed to be very straightforward. Without the need for drapes or a dedicated robotic surgery team, surgeons can walk into the Operating Room and set up in minutes. Surgeons can stand at a patient's bedside and easily rotate the device into position. Insertion, extraction and quadrant changes take just seconds and do not involve re-docking or switching ports.

Medgadget: *Please give us an overview of the clinical studies you have planned for MIRA.*

John Murphy: We are planning to start the IDE Colectomy Clinical Study early next year in Lincoln, Nebraska, which is close to where the company is headquartered. We will then likely expand to a few additional hospital sites.

Link: [Virtual Incision...](#)

TAGS INTUITIVE SURGICAL MINIMALLY INVASIVE SURGERY VIRTUAL INCISION

Conn Hastings

Conn Hastings received a PhD from the Royal College of Surgeons in Ireland for his work in drug delivery, investigating the potential of injectable hydrogels to deliver cells, drugs and nanoparticles in the treatment of cancer and cardiovascular diseases. After achieving his PhD and completing a year of postdoctoral research, Conn pursued a career in academic publishing, before becoming a full-time science writer and editor, combining his experience within the biomedical sciences with his passion for written communication.

