

# THE NEXT FRONTIER IN SURGICAL PRECISION: ROBOTIC COLON AND RECTAL RESECTIONS

**TRADITIONAL OPEN SURGERY FOR COLORECTAL CANCER REQUIRES A LONG INCISION** and leaves behind a painful and unsightly scar. The longer incision leads to more pain after surgery and mobility tends to be slower. A longer wound also has a higher chance of developing infections and wound-related complications. Because the bowel is manipulated by the hand during open surgery, it takes longer for the bowel to recover its digestive function after open surgery, leading to a longer hospital stay.

Over the last 30 years, minimally invasive surgical techniques have revolutionized colorectal surgical care, leading to reduced post-operative pain, shorter hospital stay and an improved cosmetic outcome. Laparoscopic ('keyhole') colorectal surgery in experienced hands is now regarded as a safe and feasible alternative to traditional open surgery, rapidly becoming the standard of care in many countries with advanced medical care.

Several large randomized studies have demonstrated comparable results between laparoscopic and conventional surgery. However, the long learning curve of laparoscopic surgery, together with inherent technical difficulties such as the loss of three-dimensional view, diminished tactile sense, reduced manual dexterity, and assistant-dependent camera manipulation meant that laparoscopic surgery in technically demanding colorectal procedures continues to present a challenge, in particular for resection of mid and low rectal cancers located deep within the narrow pelvis.

Robotic surgical technology has emerged as a quantum leap in the surgical evolution for overcoming these technical difficulties. It presents several distinct advantages over traditional laparoscopic surgery:

1. A unique 3D stereoscopic, immersive view of the operative field, with excellent depth perception, adjustable 10x magnification and a stable surgeon-controlled camera platform, obviating reliance on an assistant and reduces eyestrain. Visualization of fine structures such as nerves and vessels are greatly enhanced.
2. EndoWrist® instrumentation with dexterity and range of motion far greater than even the human hand, allows for more technically challenging manoeuvres such as suturing and knot tying. The surgeon also regains three extra degrees of motion that are lost with conventional laparoscopy by using articulated instruments which more closely simulate the movements of the human wrist.
3. Intuitive® Motion technology preserves the natural eye-hand-instrument alignment and intuitive instrument control for a more fluid and natural operative experience.
4. The robotic surgeon benefits from tremor-filtering and motion-scaling (up or downscaling), achieving an unprecedented level of precision and control during operative dissection.
5. Reduced physical strain for the operating surgeon. Conventional laparoscopy often requires the surgeon to assume unnatural postures, which may result in fatigue

and injury. Robotic surgery, in which the surgeon sits with his/her forearms resting comfortably on a pad, can reduce physical stress and make the laparoscopic experience more ergonomically sound.

However, it must be remembered that the surgical robotic system is an enabling technology that allows the surgeon to perform more precise surgical dissection in a more ergonomic fashion. It does not replace the expertise of the surgeon when it comes to making surgical judgment, strategic planning of the surgical approach and the execution of the surgical procedures. At present, most surgeons utilising tele-manipulators for colorectal surgery are also accomplished laparoscopic surgeons and previous laparoscopic surgical experience has been shown to shorten the learning curve of robotic surgery.

Surgical robots may well represent the next major leap in minimally invasive surgery. While conventional laparoscopic colorectal surgery has paved the way by demonstrating the benefits of minimally invasive surgery, robotic surgery provides a more precise tool for optimal management of rectal cancer. More sophisticated surgical robots that are compact, cheaper, possesses haptic feedback and augmented reality technology may emerge in the near future and allow robotic surgery to emerge as the new standard of care. ■



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