

BENEFITS OF ROBOTIC SURGERY

Benefits to Patient

- Reduced pain and trauma to the body
- Less blood loss and need for transfusions
- Less post-operative pain and discomfort
- Less risk of infection
- Shorter hospital stay
- Faster recovery and return to work.
- Allows for a minimally-invasive approach in surgery which means much less scarring and improved cosmesis

Benefits to surgeon

- Greater precision and dexterity
- Where fine suturing techniques are required
- Robotic arms eliminate the tremor of a surgeon's hands
- Improved technique for surgery
- Reduced fatigue during surgery
- Comfortable seated position at robotic controls.

Limitations

- Current equipment is expensive to obtain, maintain, and operate
- If one of the older model non-autonomous robots is being used, surgeons and staff need special training
- Data collection of procedures and their outcomes remain limited

WHAT ALL A ROBOT CAN DO FOR SURGEONS?

Robotic surgery can, in fact, be used for a number of procedures within multiple specialties including: general surgery (i.e. laparoscopic adrenalectomy, gastric bypass), gynecological surgery (i.e. cystocele repair, hysterectomy, tubal ligation), thoracic surgery (esophagectomy, lung biopsy, tumor resection), urological surgery (donor nephrectomy, prostatectomy, and ureter harvest), vascular surgery (aortic abdominal aneurysm and vena cava tumor). There are no laparoscopic procedures that can be performed by Robotic surgery. There are a number of emerging robotic procedures that will not be able to be performed by laparoscopic technique.

However, the number of surgical applications of robot-assisted surgery are increasing slowly, mainly due to the high investment and running costs of the devices even though the initial benefits exist. But new applications must be developed as the full range of robotic application is still to be implemented. The initial concept of robotics in surgery involved operating at a remote site from the surgeon. The ability to transpose surgical and technical expertise from one site to a distant site (i.e.: proctorship, assisting developing country or remote area like) was thought to expand surgical application. Although simple surgical procedures have been performed remotely, there are some difficulties for an extensive

clinical use because of high costs, transmission delay and medical and legal issues.

THE LEARNING CURVE

The FDA requires manufacturers to train surgeons before they can use robotic surgical systems on patients. Ogden says there is a significant learning curve involved. "As it stands now, it takes 12-18 patients before surgeons feel comfortable and before surgeons are able to perform the procedures as quickly as with standard techniques," he says.

Paul Nolan of Computer Motion says typical training for surgeons who buy the ZEUS system involves up to 40 hours, including experience at animal and cadaver labs.



THE FUTURE OF ROBOTIC SURGERY

Robotic surgery is in its infancy. Many obstacles and disadvantages will be resolved in time and no doubt many other questions will arise. Many questions have yet to be asked; questions such as malpractice liability, credentialing, training requirements, and interstate licensing for tele-surgeons, to name just a few.

Telerobots may also serve as the assistant surgeon as well as the operating surgeon. Telemedicine, telerobotics and virtual reality systems are rapidly evolving in conjunction with the rapid growth of the capabilities of computer systems.

By providing the use of a variety of technologies to enhance the capabilities of human surgeons, robotics will become an increasingly vital component in the medical world. Doctors of the next century must learn to use this information to complement their capabilities in order to provide better patient care.

RECOMENDED READING

1. Himpens J, Leman G, Cadiere GB. Telesurgical laparoscopic cholecystectomy [letter]. *Surg Endosc* 1998;12:1091
2. Rockall TA, Darzi AW. Telesurgical robots in surgery. *Br J Surg* 2003;90:641-643
3. Piazza L, Caragliano P, Scardilli M, et al. Laparoscopic robot-assisted right adrenalectomy and left ovariectomy [case reports]. *Chir Ital* 1999;51:465-466.
4. *Primer of Robotic & Telerobotic surgery* by Garth H. Ballantyne

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