

SURGICAL PROCEDURE TO LIVING HUMAN BY NONLIVING COMPUTER ASSISTED BRAIN

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ABSTRACT

Robotic surgery is a method to perform surgery using very small tools attached to a robotic arm. The surgeon controls the robotic arm with a computer. You will be given general anesthesia so that you are asleep and pain-free. The surgeon sits at a computer station and directs the movements of a robot. Small surgical tools are attached to the robot's arms. The surgeon makes small cuts to insert the instruments into your body. A thin tube with a camera attached to the end of it (endoscope) allows the surgeon to view enlarged 3-D images of your body as the surgery is taking place. The robot matches the doctor's hand movements to perform the procedure using the tiny instruments. Robotic surgery is similar to laparoscopic surgery. It can be performed through smaller cuts than open surgery. The small, precise movements that are possible with this type of surgery give it some advantages over standard endoscopic techniques. The surgeon can make small, precise movements using this method. This can allow the surgeon to do a procedure through a small cut that once could be done only with open surgery. Once the robotic arm is placed in the abdomen, it is easier for the surgeon to use the surgical tools than with laparoscopic surgery through an endoscope. The surgeon can also see the area where the surgery is performed more easily. This method lets the surgeon move in a more comfortable way, as well. Robotic surgery can take longer to perform. This is due to the amount of time needed to set up the robot. Also, some hospitals may not have access to this method. However, it is becoming more common. Robotic surgery may be used for a number of different procedures, including: Coronary artery bypass, Cutting away cancer tissue from sensitive parts of the body such as blood vessels, nerves, or important body organs, Gallbladder removal, Hip replacement, Hysterectomy, Total or partial kidney removal, Kidney transplant, Mitral valve repair, Pyeloplasty (surgery to correct ureteropelvic junction obstruction), Pyloroplasty, Radical prostatectomy, Radical cystectomy, Tubal ligation. Robotic surgery cannot always be used or be the best method of surgery. The risks for any anesthesia and surgery include: Reactions to medicines, Breathing problems, Bleeding, Infection. Robotic surgery has as many risks as open and laparoscopic surgery. However, the risks are different. Before the Procedure: You cannot have any food or fluid for 8 hours before the surgery. You may need to cleanse your bowels with an enema or laxative the day before surgery for some types of procedures. Stop taking aspirin, blood thinners such as warfarin (Coumadin) or Plavix, anti-inflammatory medicines, vitamins, or other supplements 10 days before the procedure. After the Procedure: You will be taken to a recovery room after the procedure. Depending on the type of surgery performed, you may have to stay in the hospital overnight or for a couple of days. You should be able to walk within a day after the procedure. How soon you are active will depend on the surgery that was done. Avoid heavy lifting or straining until your doctor gives you the OK. Your doctor may tell you not to drive for at least a week. Surgical cuts are smaller than with traditional open surgery. Benefits include: Faster recovery, Less pain and bleeding, Less risk for infection, Shorter hospital stay, Smaller scars. Alternative Names: Robot-assisted surgery; Robotic-assisted laparoscopic surgery; Laparoscopic surgery with robotic assistance.

KEYWORDS: Robot-assisted surgery; Robotic-assisted laparoscopic surgery; Laparoscopic surgery; Artificial Intelligence.

INTRODUCTION

Robot, any automatically operated machine that replaces human effort, though it may not resemble human beings in appearance or perform functions in a humanlike

manner. Robots are widely used in such industries as automobile manufacture to perform simple repetitive tasks, and in industries where work must be performed in environments hazardous to humans.^[1-6]



Figure-1: Joseph Rosen & Sudhir Srivastava; the scientist of foreign and Indian who inventor robotic surgery.

Dr Joseph Rosen [Israel; Born: 1958] In 1987, Joseph Rosen left Stanford for a faculty position at Dartmouth Medical Center, and US Army Colonel (COL) Richard Satava, MD, joined the team as SRI began construction of the first prototype of a robotic surgery system. **Dr Sudhir Srivastava** [USA; Born: 1954] opened up about developing the first India-made surgical robot that could pave the way for a brighter future in the healthcare sector. Robotic surgery helps doctors to perform complex surgeries with precision and ease, thus, benefiting patients as well.^[7]

A specially trained surgeon uses robotic technology to operate through small incisions. Robotic surgery can be used to treat conditions affecting your heart, digestive system, bladder, prostate and more. Benefits include less blood loss, shorter hospital stays and quicker recovery.

Robotic surgery may be used for a number of different procedures, including: Coronary artery bypass. Cutting away cancer tissue from sensitive parts of the body such as blood vessels, nerves, or important body organs. Gallbladder removal. Surgical removal of the gallbladder. Replacing the hip. The hysterectomy. Kidney removal, total or partial.^[8]

Robotic surgery offers many benefits to patients compared to open surgery, including:

- Shorter hospitalization.
- Reduced pain and discomfort.
- Faster recovery time and return to normal activities.
- Smaller incisions, resulting in reduced risk of infection.
- Reduced blood loss and transfusions.
- Minimal scarring.



Figure-2: Robotic Surgery.

Robotic surgery involves risk, some of which may be similar to risks of conventional open surgery, such as a small risk of infection and other complications. There are several types of pain associated with robotic surgery: incisional port site pain, pain from the peritoneum being distended with carbon dioxide, visceral pain, and shoulder tip pain. A Robotic-assisted surgery benefits you directly—shorter recovery time—as well as indirectly—the surgeon has better visualization, leading to a more precise surgery. Other benefits: Your surgeon has greater range of motion and dexterity. The Robotic

Surgery price in India ranges from Rs. 1,50,000 to Rs. 6,75,000. In addition, the effectiveness and success rates of robotic surgery are not exponentially better than those of regular surgeries, even though the prices are. Most robotic surgeries cost roughly \$5,000 more than their doctor-led counterparts. Currently, India has 66 Robotic surgery centers where 71 robotic systems have been installed. There are more than 500 doctors who are trained in using robotic systems for surgical procedures.^[9]

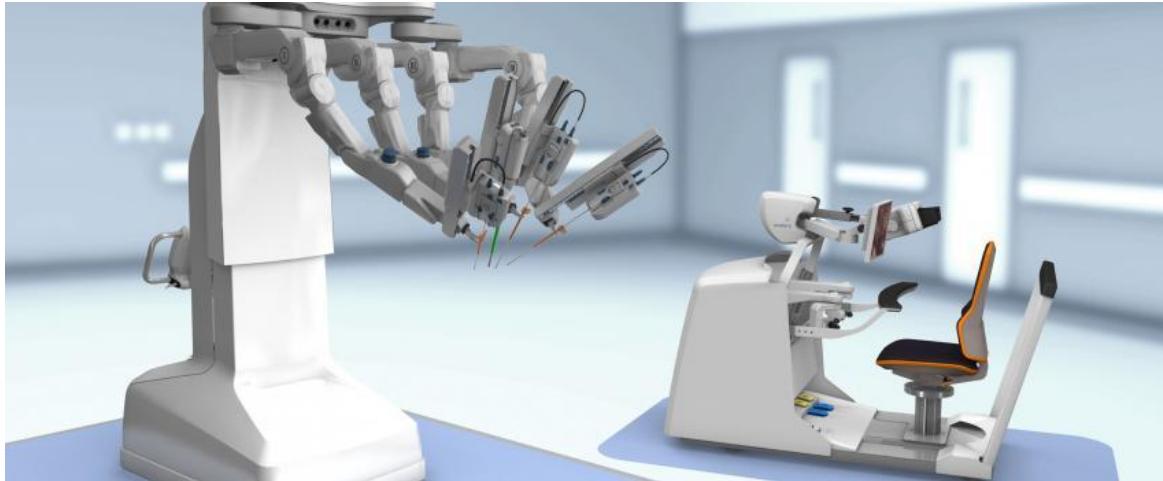


Figure-3: Robots getting prepared prior to surgery.

Risks During Surgery: These include the loss of a large amount of blood, as well as possible inadvertent cuts, tears, punctures, burns or other injuries to organs, tissues, major blood vessels or nerves. Artificial intelligence uses algorithms to give machines human-like abilities to make decisions and perform cognitive functions, and may well represent the future of surgical robotics. Machine learning, a subset of AI, enables machines to make predictions by recognizing patterns that may be imperceptible to a surgeon.^[10]

Benefits of Robotic Surgery: The primary benefit of robotic surgery for patients is faster recovery. This allows patients to return to daily activities sooner than with standard open or laparoscopic surgery. In addition, robotic surgeries have fewer surgical complications and result in smaller, less noticeable scars. The robotic arms, which can rotate 360 degrees, enable surgical instruments to be moved with greater precision, flexibility and range of motion than in standard minimally invasive laparoscopy. Most procedures take two to three hours under general anesthesia.



Figure-4: Robotic Surgery in running.

Aside from compiling a large set of information to learn from and develop new trends, AI can enhance robotic surgery by alleviating surgeons' stress. By highlighting tools, monitoring operations and sending alerts, AI-based systems can guide surgical procedures and ensure a more streamlined process. AI-based algorithms combined with the precision and control of surgical robots are revolutionizing the way we look at surgeries in this age. It has the power to simplify the medium of interaction between surgical robots and surgeons, with the help of deep machine learning data. The da Vinci Surgical

System is a robotic surgical system that uses a minimally invasive surgical approach. The system is manufactured by the company Intuitive Surgical. The system is used for prostatectomies, and increasingly for cardiac valve repair, and for renal and gynecologic surgical procedures. It was used in an estimated 200,000 surgeries in 2012, most commonly for hysterectomies and prostate removals. The system is called "da Vinci" in part because Leonardo da Vinci's study of human anatomy eventually led to the design of the first known robot in history.^[11]

Device and instrument malfunctions, such as falling of burnt/broken pieces of instruments into the patient (14.7%), electrical arcing of instruments (10.5%), unintended operation of instruments (8.6%), system errors (5%), and video/imaging problems (2.6%), constituted a major part of the reports.

After minimally invasive and robotic surgery, there is no need for bed rest at home. Patients will have some discomfort and increased fatigue, but should try to stay active, walking slowly and often – increasing walking time as they are able. Patients should eat a healthy diet and drink lots of water to speed healing.^[12]

Laparoscopic and robotic surgery are both minimally invasive and very commonly used by surgeons for procedures of the abdomen and pelvis. These two types of surgeries differ from traditional open surgery because they require small incisions and use a camera that magnifies the view of the procedure.

Robotic-assisted surgery is major surgery performed through small incisions. It has the same kinds of risks as open surgery, including injuries to intra-abdominal organs. There also are risks of medical complications such as stroke, heart attacks and blood clots in the legs. This is the biggest difference between these two techniques, as in traditional laparoscopic surgery the

surgeon has the instruments in his own hands as opposed to them being attached to the robot, which is then controlled via the console.

Robotic Surgery cost in India ranges vary from Rs. 1,70,000 to Rs. 4,75,000 (one lakh seventy thousand to four lakh seventy-five thousand). However, price of robotic surgery in India depends upon the multiple factors such as hospital, type of surgery, room selection and insurance for cashless benefits. The Apollo Institute of Robotic Surgery is considered to be the best hospital for robotic surgery in India and is committed to providing patients with exceptional clinical outcomes. The following decade saw an unprecedented growth of robotic surgery in India. There are currently 66 centers and 71 robotic installations as on July 2019, with more than 500 trained robotic surgeons in our country. More than 12,800 surgeries have been performed with robotic assistance in these 12 years. When researching the purchase of an industrial robot, you'll find that the price can range anywhere from about \$25,000 for an entry-level robot arm to upwards of \$400,000. Stryker Corporation is one of the world's largest surgical and medical robotics companies. They are a global leader in robotic-assisted medical technology, providing cutting-edge solutions for surgeons to help improve patient outcomes.^[13]



Figure-5: Surgical Robot by Artificial Intelligence.

Dr Lavanya Kiran has become the first robotic surgeon in India to conduct nine complicated surgeries using robotics in a short span of 17 days. India's first and only Made-in-India surgical robot, SSI Mantra, recently achieved the significant milestone of 100 successful surgeries within six months of its commercial launch. For example, robotic surgery should not be performed in a critically ill patient who needs emergency surgery or a trauma patient. Some types of comorbidity. Comorbidity is having more than one medical condition at a time.

Most respondents (72%) indicated that RS was safer, faster, and less painful or offered better results, but when asked if they would choose to have RS, 55% would prefer to have conventional minimally invasive surgery. A meta-analysis found no differences between the open and the minimally invasive approach (robotic and

conventional) in terms of success and complication rates. Patients who underwent minimally invasive operations had a shorter hospital stay, less analgesics but longer operation times. The risk of infection is drastically reduced. This also means shorter hospital stays and faster recovery, and the patient can return to normal life much sooner. Robotic surgery is often minimally invasive, making it quite safe. Similarly to retroflexion in endoscopy, tasks such as tissue retraction, suturing, and ablation can be automated in robotic surgery.^[14]

In 1987, Joseph Rosen left Stanford for a faculty position at Dartmouth Medical Center, and US Army Colonel (COL) Richard Satava, MD, joined the team as SRI began construction of the first prototype of a robotic surgery system, which Dr. Robotic surgery offers greater precision, less pain, and shorter recovery times, while

traditional surgery provides a more hands-on approach and is often more cost-effective. Ultimately, the choice between the two will depend on the patient's needs and the surgeon's expertise. By reducing length of stay (LOS) and complications, robotic surgery can help hospitals reduce overall treatment costs and produce a net savings of \$1,200 per surgery, an expert contends in the New York Times. Robots can create economic problems because they continuously replace humans. Robots can only do what they are told to do, meaning they can't do more than expected without any command (by the way, machine learning and Artificial Intelligence are working on it).

Disadvantages of robots: Robots need a supply of power, The people can lose jobs in factories, They need maintenance to keep them running, It costs a lot of money to make or buy robots, and the software and the equipment that you need to use with the robot cost much money.^[15,16]

Disadvantages of robots

Robots are Expensive. Robots replace humans.
Maintenance and Security. The upfront cost is not the only aspect of making the robots expensive.
Human capabilities and Emotionlessness.
Power and Programming.
Increase in the rate of unemployment.

CONCLUSION

Robotic surgery, also called robot-assisted surgery, allows doctors to perform many types of complex procedures with more precision, flexibility and control than is possible with conventional techniques. Robotic surgery is usually associated with minimally invasive surgery — procedures performed through tiny incisions. It is also sometimes used in certain traditional open surgical procedures. The most widely used clinical robotic surgical system includes a camera arm and mechanical arms with surgical instruments attached to them. The surgeon controls the arms while seated at a computer console near the operating table. The console gives the surgeon a high-definition, magnified, 3D view of the surgical site. The surgeon leads other team members who assist during the operation.

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