

An Overview of Robotic Surgery

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EDITORIAL NOTE

Surgical techniques utilising robotic technology are referred to as robotic surgery. The purpose of robotically assisted surgery was to increase the capabilities of clinicians performing open surgery by overcoming the limitations of existing minimally invasive surgical procedures. In robotically assisted minimally invasive surgery, the surgeon uses one of two approaches to distribute the instruments instead of moving them directly. Two choices are to use a direct telemanipulator or computer control.

A telemanipulator is a remote manipulator that enables the surgeon to do all standard surgical manoeuvres. End-effectors and manipulators are used by the robotic arms to carry out the actual surgery. In computer-controlled systems, the surgeon uses a computer to control the robotic arms and end-effectors, albeit these systems may still require telemanipulator for input.

One advantage of using a computerised technique is that the surgeon does not have to be present throughout the procedure, allowing for remote surgery. Robotic surgery has been criticised for its high cost, with average costs ranging from \$5,607 to \$45,914 per patient in 2007. Because of questions about its safety and use, this method has not been licensed for cancer surgery as of 2019.

The Arthrobot was the first robot to assist in surgery, and it was designed and deployed for the first time in Vancouver in 1985.

This robot assisted in manipulating and placing the patient's leg on voice command. Dr. Brian Day, a biomedical engineer, Geof Auchinleck, a UBC engineering physics graduate, and James McEwen, a biomedical engineer, were all intimately involved, as

were a number of engineering students. A robot, the Unimation Puma 200, was used to orient a needle for a brain biopsy while under CT observation in 1985 during a neurological treatment. In the late 1980s, Imperial College in London developed PROBOT, which was later used to do prostate surgery. This robot's advantages included its small size, precision, and lack of fatigue for the surgeon.

The ROBODOC was created to replace the traditional method of cutting a femur for implant placement, which used a mallet and a broach/rasp. SRI International and Intuitive Surgical continued to develop robotic systems with the introduction of the da Vinci Surgical System and Computer Motion with the AESOP and ZEUS robotic surgical systems. The first robotic surgery was done at The Ohio State University Medical Center in Columbus, Ohio, under the direction of Robert E. Michler. AESOP was a game-changer in robotic surgery when it was first released in 1994, as it was the first FDA-approved laparoscopic camera holder.

Computer Motion, the company that develops AESOP, was originally funded by NASA to build a robotic arm for use in space, but the project morphed into a camera used in laparoscopic procedures.

ZEUS was first commercially available in 1998, and it pioneered the concept of telerobotics or telepresence surgery, in which the surgeon performs on the patient while sitting at a distance from the robot on a console.

ZEUS made its most visible contribution in cardiac surgery in 2003, when it successfully harvested the left internal mammary arteries in 19 patients, all of whom had excellent clinical results.

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