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Editorial

Robotic surgery

Surgery has traditionally been a specialty within the medical profession that has revolved around invasive procedures to treat various maladies. Rather than creating large incisions several inches long to gain access to underlying tissues, minimally invasive surgical techniques typically rely on small half-inch incisions encircling the surgical field in order to insert

small scopes and instruments. Minimally invasive surgery has caused a change in the route of access and has significantly and irrevocably changed the surgical treatment of most disease processes.

The world's first surgical robot was the "Arthrobot", which was developed and used for the first time in Vancouver, BC, Canada in 1983. The robot was developed by a team led by Dr. James McEwen and Geof Auchinlek, in collaboration with orthopedic surgeon, Dr. Brian Day. In related projects at that time, other medical robots were developed, including a robotic arm that performed eye surgery, and another that acted as an operating assistant, and handed the surgeon instruments in response to voice commands.

Robotic surgery can be further divided into three sub-categories depending on the degree of surgeon interaction during the procedure: supervisory-controlled, telesurgical, and shared-control. In a supervisory-controlled system, the procedure is executed solely by the robot, which will act according to the computer program that the surgeon inputs into it prior to the procedure. The surgeon is still indispensable in planning the procedure and overseeing the operation, but does not partake directly. Because the robot performs the entire procedure, it must be individually programmed for the surgery, making it extremely expensive to gather several images and data for one patient. A telesurgical system, also known as remote surgery, requires the surgeon to manipulate the robotic arms during the procedure rather than allowing the robotic arms to work from a pre-determined program. Using real-time image feedback, the

surgeon is able to operate from a remote location using sensor data from the robot. Because the robot is still technically performing the procedure, it is considered a subgroup of robotic surgery. The da Vinci® Surgical System, the current leading device in this field, belongs to this section of robotic surgery. The third shared-control system has the most surgeon involvement. The surgeon carries out the procedure with the use of a robot that offers steady-hand manipulations of the instrument. This enables both entities to jointly perform the tasks.

As seen, robots do not actually replace humans but rather improve their ability to operate through the small incisions.

Then what are its applications in craniofacial surgery? Difficult bone cuts and bone tumor removals are accomplished successfully using robotic instruments. Preplanned trajectories are programmed into the machine. Precision cuts are made in the manner desired to achieve an esthetical and satisfactory result.

The patient should expect a faster recovery than that achieved by traditional CAS starts with the premise of a much better visualization of the operative field, thus allowing a more accurate preoperative diagnostic and a well defined surgical planning, by using surgical planning in a preoperative virtual environment. This way, the surgeon can easily assess most of the surgical difficulties and risks and have a clear idea about how to optimize the surgical approach and decrease surgical morbidity.

Major potential advantages of robotic surgery are precision and miniaturization. Further advantages are articulation beyond normal manipulation and three-dimensional magnification. Some surgical robots are autonomous, and they are not always under the control of a surgeon.

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