Telesurgery

Remote surgery (also known as telesurgery) is the ability to perform surgery on a patient even though they are not physically in the same location. It is a form of telepresence. A robot surgical system generally consists of one or more arms (controlled by the surgeon), a master controller (console), and a sensory system giving feedback to the user.

Remote surgery combines elements of robotics, cutting edge communication technology such as high-speed data connections and elements of management information systems. While the field of robotic surgery is fairly well established, most of these robots are controlled by surgeons at the location of the surgery. Remote surgery is essentially advanced telecommuting for surgeons, where the physical distance between the surgeon and the patient is immaterial. It promises to allow the expertise of specialized surgeons to be available to patients worldwide, without the need for patients to travel beyond their local hospital.

Endonasal surgery

Novel robots have recently been developed specifically for endonasal surgery. They can deliver several thin, tentacle-like surgical instruments through a single nostril. Among the many potential advantages of such a robotic system is the prospect of telesurgery over long distances.

To describe a phantom pituitary tumor removal done by a surgeon in Nashville, Tennessee, controlling a robot located approximately 800 km away in Chapel Hill, North Carolina, the first remote telesurgery experiment involving tentacle-like concentric tube manipulators.

A phantom pituitary tumor removal experiment was conducted twice, once locally and once remotely, with the robotic system. Robot commands and video were transmitted across the Internet. The latency of the system was evaluated quantitatively in both local and remote cases to determine the effect of the 800-km distance between the surgeon and robot.

Wirtz et al. measured a control and video latency of < 100 milliseconds in the remote case. Qualitatively, the surgeon was able to carry out the experiment easily and observed no discernable difference between the remote and local cases.

Telesurgery over long distances is feasible with this robotic system. In the longer term, this may enable expert skull base surgeons to help many more patients by performing surgeries remotely over long distances [1)].

1)
Wirz R, Torres LG, Swaney PJ, Gilbert H, Alterovitz R, Webster RJ 3rd, Weaver KD, Russell PT 3rd. An experimental feasibility study on robotic endonasal telesurgery. Neurosurgery. 2015 Apr;76(4):479-84. doi: 10.1227/NEU.0000000000000623. PubMed PMID: 25599203; PubMed Central PMCID: PMC4366329.