Telesurgery: an Audit

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15.1 Telesurgery Is Still in Its Infancy

Since telesurgery is a relatively young medical technology, further long-term study with regard to patient advantages, cost-effectiveness, safety, and clinical applicability is required before the technology can be integrated into the healthcare system. As for standard robotic surgery (not telesurgery), the market is growing worldwide at an average rate of 25% annually, due, in large part, to the approval of new procedures such as single- and multi-vessel, closed-chest coronary artery bypass graft(s) (CABG) on a stopped heart, and single- and then multi-vessel closed-chest CABG on a beating heart.

In addition, given better acceptance in the general marketplace among surgeons, hospitals, and patients, this growth rate will likely to increase. It must be noted that the growth of robotic surgery will directly support and help the growth of telesurgery, because surgical robotics are, of course, an integral part of telesurgery.

15.2 Will Telesurgery Replace Traditional Methods?

Telesurgery promises to revolutionize healthcare and speed postoperation recovery. Yet, the technology requires a great deal of further development. One of the main drawbacks of existing surgical robots is the lack of tactile feedback. Surgeons using the joysticks do not actually “feel” the patient; they must rely on visual cues to judge tension. Haptics, defined as the ability to sense touch, will likely be a quality achieved by the next generation of surgical robots. Another challenge that telesurgery faces is maintaining a secure, continuous connection, with little or no delay in transmission. Major advances in technology are required before these connections can be implemented. The coming of telesurgery does not mean that surgeons can abandon traditional methods. Currently, when a surgeon is performing a telesurgery procedure on a patient at a
distance, there would need to be an individual at the scene who is competent to convert to an open procedure should things go wrong. As well, the economics of telesurgery must be further analyzed. Institutions must ensure that the cost of telesurgery does not exceed the traditional expenses involved with transporting patients and surgeons.

15.3 Economics of Telesurgery

Today, the surgical robot – the da Vinci system – has barely penetrated the market. The robotic-assisted procedure performed most frequently, laparoscopic radical prostatectomy (LRP), accounts for little more than 1% of all radical prostatectomies. Analysts forecast that the worldwide market for all robotic procedures will grow at an annual rate of 25% until 2009. Beyond 2009, it is estimated that the market will grow by 30–45% annually until 2025, due to two main reasons: (1) systems will improve in ease of use and features, and (2) new players will enter the market, as the opportunity grows and as medical robotics generally becomes more established in health care.

As described earlier in Chap. 1, on 7 September 2001, a modified ZEUS system was used to prove the technical feasibility of telesurgery. Dr. Jacques Mesescaux in New York performed a laparoscopic cholecystectomy, while his patient was 4,000 miles away in Strasbourg, France. The operation took less than an hour to complete and was hailed as the medical breakthrough of the year. Though technically feasible, however, this was not an indication of how surgical care would be delivered for two reasons: (1) the private asynchronous transfer mode (ATM) telecommunication link used was too expensive for everyday use, and (2) it makes sense to have a qualified surgeon next to the patient where possible.

However, the next phase was both clinically and financially much more realistic. On 28 February 2003, Dr. Anvari of Hamilton, Ontario, Canada, participated in two back-to-back laparoscopic Nissen procedures, assisting and guiding the local surgeon, Dr. McKinley, who was 250 miles away in North Bay, Ontario. Dr. Anvari had performed more than 1,500 such procedures, and Dr. McKinley, though a skilled laparoscopic surgeon, had performed less than 100. During the operations, Dr. Anvari routinely pointed out proper angles of approach, needle placement while suturing, hidden clues, and other intricacies that only can be seen by the eyes of an expert. It was at this point that it became obvious that telesurgery is an extremely valuable tool, not in the distant future, but today. Furthermore, though Dr. McKinley performed most of the procedure, the procedure time was comparable to an expert surgeon’s time (the first case took less than an hour, and the second case took about 90 min to