

Teleconferencing and Ear Surgery

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The Croatian International Otology Spring School has been active at the ENT and Cervicofacial Surgery Clinic Šalata within the Zagreb Medical School for several years.

The goals of the School are:

1. the exchange of experiences between Croatian and leading world ear surgeons (otosurgeons)
2. the education of primarily Croatian otolaryngologists
3. the furthering of international cooperation of the ENT and Cervicofacial Surgery Clinic Šalata and Croatian otolaryngologists.

Although the School is active throughout the year, spring is the most intensive time period when the Ear Microsurgery Course is held. During the course leading world and Croatian otosurgeons hold a large number of lectures and discussions and undertake 6 - 10 surgical procedures for educational purposes.

When the School was started 4-5 years ago, the main problem was how to allow the relatively large number of attendees (60 - 100 attendees) to observe the surgical procedures. To address this issue from the outset cooperation was initiated with CARNet (the Croatian Academic Research Network). All surgical procedures must be performed in the Clinic's operating rooms, while the most suitable auditorium for the attendees was located at the main building of the Zagreb Medical School. The necessary technical prerequisites were met since the auditorium is in the immediate vicinity of CARNet's node at Šalata, while a fiberoptics switch is located directly outside of the operating room. After two years of preparations the first course was held in the spring of 2000 and since then every April six to ten surgical teleconferences are held. Ear surgery is a microsurgical technique. Due to the extremely small structures that need to be cleaned or reconstructed inside the ear, all procedures are performed utilizing magnification, i.e.

microscopes. Digital cameras are attached to all microscopes, so that the course attendees have a view nearly identical to that of the surgeon performing the operation. However, some portions of the procedures (the initial incision on the skin, a view of the patient's medical reports) cannot be viewed with the cameras mounted on the microscope, rather a macrocamera must be used. It is therefore desirable to have both a micro and a macro camera in each operating room. In order to maintain the dynamics of the course, the less interesting parts of the surgical procedure are not covered (introduction in anesthesia prior to the operation, the stitching of the skin at the place of incision, the bandaging of the wound, the awakening from anesthesia), and two procedures are being performed alternately in two operating rooms.

The staff in charge of surgical teleconferences such as this one is faced with numerous challenges. It is necessary to coordinate the operation of 3-4 cameras and several microphones while observing all rules, mainly concerning sterility, that apply to operating rooms. The International Spring School of Otosurgery experiences confirm this extremely good collaboration every year. The broadcast of surgical procedures via teleconferencing has many characteristics that differentiate it from other information transmissions over the Internet.

In medicine in general, and especially in its surgical fields, it is not possible to describe the work method accurately using words and numbers. The basic goals of most surgical procedures, which are mainly the healing of an illness or the repair of the structure and function of some organ or body part, can be achieved with varying degrees of success. The success with which a top surgeon can achieve these goals, when compared to novices, is not only attained through the knowledge of a larger number of surgical procedures, but also by an entire array of details on how these procedures are performed. Even photographs in most cases don't provide sufficient information on how to perform some surgical procedure. One method of conveying this information has been video recording and subsequent showing of the material. A drawback of this technique is that during the viewing of the previously recorded video it is often not possible to obtain additional information of interest to the viewer that weren't recorded at the time of the procedure.

During the teleconference there exists a communication between the surgeon performing the surgical procedure and the observers who are following it. There can be one or more observers, who due to the interactive nature of the transmission are also active participants. Based on the knowledge and experience of the observer(s) in relation to that of the surgeon performing the procedure, surgical teleconferences can be categorized as follows:

1. *teleeducation* – the most experienced surgeon with the most knowledge is performing the surgery while others are learning by observing and asking questions
2. *teleconsultation* – a less experienced surgeon is performing the surgery while one or more colleagues help with their advice and experience
3. *discussion* – several colleagues with approximately the same level of experience follow the surgery performed by one of them. By discussing, as a team, they exchange experiences with the goal of improving existing techniques and achieving the best possible result.

It is not uncommon that a combination of several of these surgical teletechniques is used. The classical, old method of education was for the less experienced surgeons to be present in the operating room during the surgical procedure and observe the procedure. The drawbacks of this method are:

1. The number of such observers was limited. Operating rooms are most often designed to accommodate the patient, the surgical and anaesthesiological teams and all the necessary equipment. In general there is no space for a large number of observers, and with technological advances the amount of equipment used in operating rooms is increasing leaving less space for observers.
2. The presence of the observers in the operating room interfered with the work of the surgeon and other team members. The observers could only have a good view of the procedure from the close vicinity of the surgical field where they would interfere the staff performing the procedure.
3. Additional persons in the operating room impact contamination and decreased sterility of the operating room and surgical instruments.

4. Due to the facts mentioned above, the observers had to move away from the operation field and therefore had a poor view during the procedure.
5. It was not uncommon for the observers to travel from remote locations in order to view a procedure in the operating room. This involved additional transportation and accommodation costs as well as significantly increased time consumption.

The advantages of teleconferencing in surgery are:

1. In most cases the number of observers is unlimited.
2. The observers are at a remote location and do not distract the surgeon with their presence in the operation room.
3. The observers don't impact the sterility of the operating room.
4. By placing the camera directly above the operation field (on the surgical microscope, on the surgeon's head light, on the endoscope or simple surgical source of light) and the transmission of the picture along with verbal explanations, the remote observers have better information than if they were in the operating room itself.
5. By transmitting the information over large distances it is no longer necessary to travel to the source of information, thus saving time and money.
6. The impossibility to foresee is a characteristic of medicine and surgery. A planned surgical procedure may appear routine and very simple before the operation starts. However, at any time during or after the procedure unexpected situations or various complications can occur which the surgeon is unable to resolve on his own. In such unexpected situations, utilizing teleconferencing, surgeons can ask for help and advice from more experienced colleagues at remote hospitals. Healthcare costs are also decreased because patients can have more procedures performed in their local hospital without the need for additional expenses for traveling to larger medical centers.