NEW INSTRUMENTATION

Cadaveric Hands-on Workshop Using a Three-Dimensional High-Definition Television System

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Abstract—We report the introduction of a three-dimensional high-definition television system in cadaveric microneurosurgical hands-on workshops on skull base technique. The system was found to be a useful means of exact communication between the instructor and the participants and avoided congestion around the instructor's table. The instructions could be relayed to the multiple participants at one time and thus avoided repetitions. More participants could be accommodated in the workshops. The entire proceeding could be recorded three-dimensionally for later use and educational purposes. (*Skull Base Surgery*, 6(3):191–192, 1996)

Three-dimensional high-definition television (3D-HDTV) system has been reported to be useful for relaying and recording high quality images during microsurgical procedures.¹ The system has been found to be helpful for the education of medical students and training of residents. High quality pictures with resolution comparable to 35-mm movie film provided by the 3D-HDTV system² were seen to be particularly suited to microsurgical procedures under the operating microscope.

We introduced the 3D-HDTV system for a hands-on skull base workshop using cadaveric materials. Technical details and further possibilities are discussed.

METHODS AND MATERIALS

The 3D-HDTV documentation system is based on the wide-vision telepresence system using one camera and one monitor, which we have developed.¹ A 3D-HDTV camera is installed on the output of the exclusively designed 3D attachment device for a standard operating microscope. The device conducts two images from the right and left outputs of the stereoscopic microscope in one HDTV image which can be observed using a conventional, parallel eye method or a stereoscopic viewer.

The 3D-HDTV system was introduced to the cada-

veric hands-on workshop in Tokyo, which was held as one of the satellite activities at the annual meeting of the Japan Neurosurgical Society on September 23, 1993.

RESULTS

Six cadaver specimens were used at a time, one by the instructor and five shared by 40 participants. On the instructor's table, an HDTV camera with the 3D attachment device was attached to the operating microscope (Fig. 1). The instructor dissected the cadaver, which was observed by each participant on the 3D HDTV image on screen or monitor. On the basis of the guidelines provided, the participants then dissected the specimen under supervision. Provisions were made to permit review of the instructor's dissection steps using recorded 3D-HDTV video images, available to the participants as needed.

DISCUSSION

The cadaveric dissection microneurosurgical courses in neurosurgery are becoming increasingly popular. These courses are usually attended by more participants than the available facilities can accommodate. However, there are

Figure 1. Operating microscope with 3D high-definition television (3D-HDTV) system in hands-on workshop. A: The Hi-Vision camera and 3D attachment device are installed on an operating microscope. B: 3D-HDTV image on the HDTV monitor for presentation in the workshop.

difficulties in acquiring an adequate number of cadavers for these workshops. In several countries, religious considerations limit use of cadavers. Each participant is eager to observe the dissections, particularly those performed by the instructor. For the smooth running of the proceedings and avoidance of repetitions, the need for a clear projection of dissections was found to be necessary. Although 3D TV camera systems are used in some dissection courses, their resolution is not sufficiently satisfactory for fine anatomic structures.

As technology has advanced, HDTV cameras have

become smaller and lighter weight,³ and thus easier to handle. We have developed a 3D-HDTV system using one HDTV camera with an exclusively developed attachment device.¹ The system provides 3D microscopic video images of near live-quality, based on the HDTV system.

Demonstration of the cadaveric hands-on workshop using the 3D-HDTV system may play significant roles in skull base lesion treatment. First, the dissection technique is conducted in real time during the workshop. Every participant can recognize each detail of the technique via the 3D-HDTV video images and share the surgical orientations simultaneously. Second, the dissection techniques of the instructor can be recorded for later use (Fig. 2). The recorded 3D-HDTV materials may be helpful for the education and training of resident medical students. Furthermore, they will supply useful surgical information for skull base surgeons who have less chance to join the modern hands-on workshop in foreign countries.

Figure 2. Direct print of the recorded HDTV image.

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