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VIEWPOINT

Reconstructive

Can 4K-3D Video Monitor-based Surgery Replace Microscope Use in Free Flap Transfer?

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Endoscopic and robot-assisted surgery are increasingly used, and video monitor-based surgery is becoming the mainstream technique in gastrointestinal surgery. Although plastic surgeons have mainly used microscope-based systems since the 1970s, will video monitor-assisted surgery become the main tool? We share our experience with such a system.

"Hawksight" (Mitaka Kohki, Tokyo, Japan) is a 4K–3D video monitor system similar to a small operating microscope (Fig. 1). The surgeon sees the images through the 55-inch 3D monitor, while the assistant surgeon on the other side uses a 31-inch 3D monitor. When wearing special 3D glasses, other staff can also see the 3D view. Using Hawksight, free jejunum flaps were transferred after total laryngo-pharyngo-esophagectomy for patients with hypopharyngeal cancer. The surgeons used Hawksight throughout the anastomoses (Fig. 2). (**See Video 1 [online],** which shows the arterial anastomosis.) (**See Video 2 [online],** which shows the venous anastomosis.) Four arterial anastomoses to the cervical vessels (superior thyroid, lingual, and transverse cervical arteries) were performed in an end-to-end fashion with 9-0 nylon sutures. Three venous anastomoses were made with various couplers (Synovis MCA, Birmingham, Ill.) in an end-to-end fashion to branches of the internal jugular veins, and one in an end-to-side fashion to the internal jugular vein. The time taken averaged 46 minutes (range 33–62 min) for arteries, and 31.3 minutes for veins (15–49 min). The flaps survived without any complications.

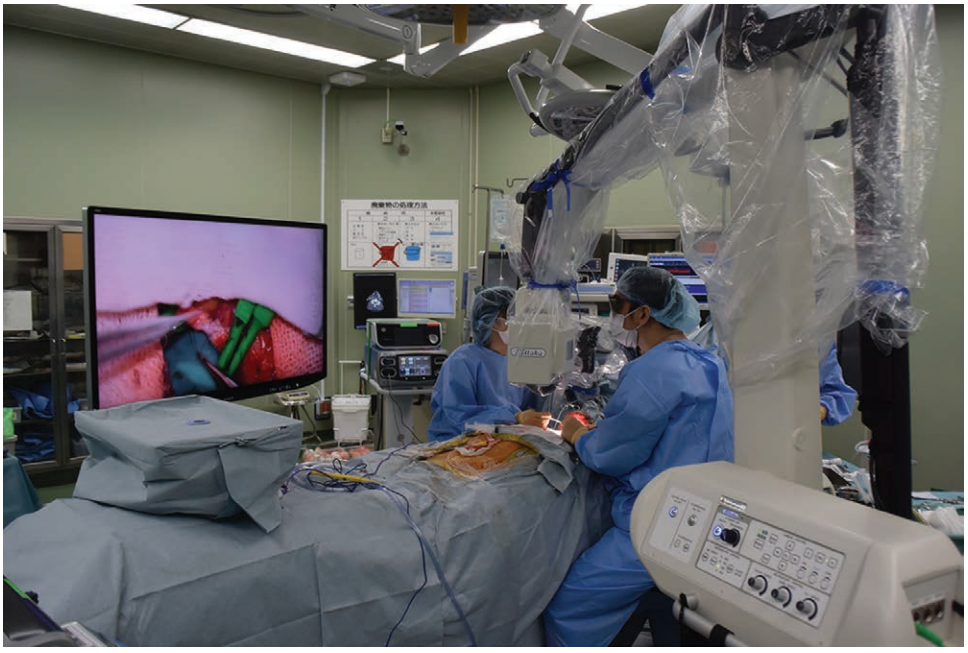

Fig. 1. The surgeon (right) performs microsurgery via the 55-inch 4K–3D monitor, wearing 3D glasses. The assistant surgeon sees the same image on the 31-inch monitor.

Video monitor-based surgery is becoming a standard technique in many types of surgeries, such as oral or

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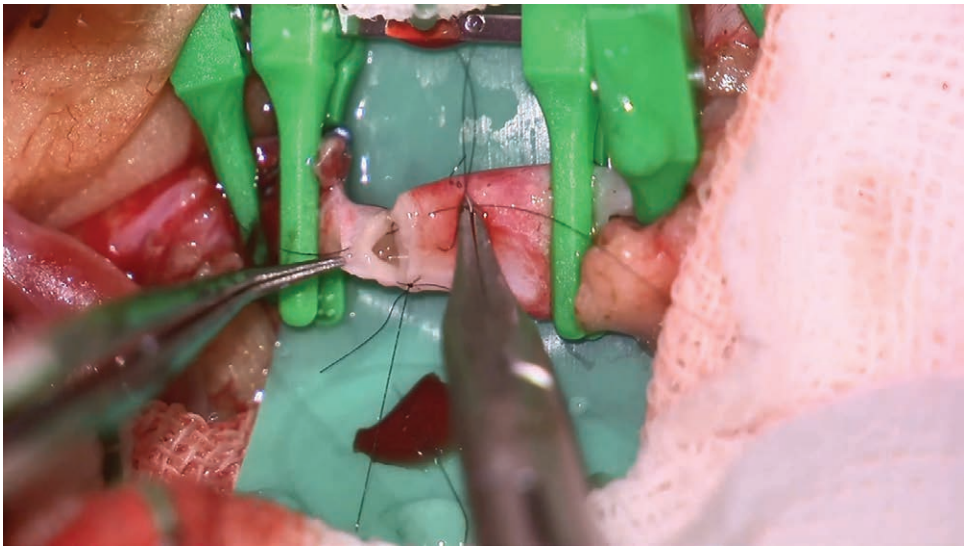

Fig. 2. As the maximum magnification is 110×, a sufficient zoom view is obtained for head and neck microvascular reconstruction.

laryngeal surgeries, or robotic surgery for head and neck lesions. The advantage of this 4K–3D system in our experience is that the magnification is higher than with conventional microscopes, handling is similar, and because of the longer focal distance (100 cm), more space is secured in front of the surgeon. The maximum magnification of conventional microscopes is 20–30×, whereas it is 110× with Hawksight. Higher magnification assists in assuring the accuracy of anastomosis during, for example, lymphatic surgery. Even if the imaging camera is placed in an area not visible to the surgeon, the operation can be continued using the monitor. Thus, another advantage is the ability to benefit from magnified surgery in areas where a conventional microscope cannot access the field of view.

Note that all the assisting staff can also obtain a 3D view if 3D glasses are worn, but only a 2D view can be seen through a conventional microscope monitor.[1] The system also has advantages for teaching.[2] The system has been advocated for micro–macro borderless surgery because it works at both low and high magnifications.[3,4] What is of concern is that surgeons might be unfamiliar with video monitor-assisted surgery. Moreover, there is a slight difficulty in seeing white objects, and surgeons tend to set the magnification too high. The more we can zoom in, the more we do so. Because the microsurgical maneuvers are almost the same as in standard methods, we believe that plastic surgeons can transit easily to this system once they get used to the monitor-based style. This approach is expected to become popular in plastic surgery.

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DISCLOSURE

The authors have no financial interests to declare in relation to the content of this article.

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