

超高速インターネットを介した日韓手術支援

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FOCUS**Introduction of Research Genkai/Hyunhae Project****Telesurgery between Korea and Japan over broadband Internet**

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Endoscopic surgery and its problems

With the advent of new techniques and devices, endoscopic surgery has been recently introduced and revolutionized surgical procedures. It has provided patients with a wide variety of surgical procedures associated with small incisions, less pain, and faster recovery than conventional open surgery.

Specialized techniques and ample experience are necessary to perform this patient-friendly operations, and therefore the education system has become much more important in this field. However, surgeons can usually learn these endoscopic surgical skills only through books or edited videos, and it is basically not practical to visit and see the real procedures in other advanced institutions. Under these poor circumstances, it is no wonder that some surgeons dare to start the unfamiliar operations and make a serious accident due to the lack of full practice.

In order to solve these problems, we invented the teleconference system by sending and receiving high-quality moving images on broadband Internet. Surgeons can simultaneously watch and discuss each other with real-time transmission of surgery.

Hospital and small blood vessels or fine tissue structures were well recognized. Clear sound could also be preserved for discussion. Time delay was less than 0.01 sec between both endpoints of the network. There was no detectable reduction in image quality between the original and transmitted images. This is one of the most important factors for medical use. DVTS was suitable for this purpose, because there was no requirement of complex process of encoding and decoding and so the system was easily prepared and cost less.

Future prospects

A teleconference with live broadcast of surgery in high quality moving images was very useful for learning new surgical procedures. This system can also be applicable to other medical fields such as pathology, radiology, dermatology, etc., where images are of great importance. Because the Internet is connected worldwide, this must be helpful not only domestically but also internationally. In addition, this system will be more widely and more easily utilized, since the Internet is still under rapid extension.

Teleconference between Korea and Japan

This project is a medical part of the Genkai/Hyunhae Project (<http://genkai.info>), which was established to develop network research and communication between Korea and Japan over submarine optic cable, the Korea-Japan Cable Network (KJCN) constructed under the Sea of Japan in 2001. Network of 600 km away between Kyushu University Hospital in Fukuoka, Japan and National Cancer Center (NCC) or Hanyang University Hospital, Korea, is as follows; a) Kyushu GigaPOP (QGPOP) between KU and Asia Pacific Internet Infrastructure Genkai Network Operation Center (APII/Genkai NOC), b) the KJCN lines between Fukuoka and Busan, and c) Korea Advanced Research Network (KOREN) between Busan and Seoul.

Customized DVTS (Digital Video Transport System; DVTS STREAM, Fujitsu Co, Tokyo, Japan) was set up for this teleconference. High-quality, non-compressed DV-formatted moving images could be transmitted with this instrument. We could keep enough bandwidth of 30 Mbps for a line of transmission. Two lines for this teleconference were prepared; one for the surgical video transmission and the other for the discussion or sending the other medical still-images with sounds. Furthermore, a cipher program (C4-VPN) was prepared to protect the patient's privacy.

The first real-time transmission of endoscopic surgery was successfully started in August, 2003. In Korean institutions, doctors could watch the surgical procedures of laparoscopy assisted distal gastrectomy performed in Kyushu University



The surgical staff in Kyushu University Hospital



The KU staff, discussing with Korean staff on network



Korean doctors discussing with Japanese staff while watching the live surgery image transmitted from Kyushu University Hospital