

Digital Image Processing for Dynamic Color Images of Laryngeal Lesions Obtained With Electronic Videoendoscopy

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Introduction : Laryngeal lesions were observed using the OLYMPUS EVIS-200 electronic videoendoscope system attached to the OLYMPUS ENF-200 rhinolarynx endoscope portion. This endoscope portion can be introduced into the laryngeal cavity by inserting it through the nasal passages. Since it is also possible to connect the OLYMPUS EVIP-230 digital image processor capable of processing dynamic images in real time to this system, an attempt has also been made to process the dynamic color images of laryngeal lesions obtained with the electronic videoendoscope system. Structure enhancement and color enhancement were performed as processing images. The images of laryngeal lesions obtained with this system and the processed images are presented and described from the standpoint of diagnostic usefulness.

Material and Methods : Two patients are the subjects in this study, a 45-year-old man with a right vocal fold polyp and a 64-year-old man with right invasive supraglottic cancer. Electronic videoendoscopic examinations were performed with system and the digital image processor.

Results : Blood vessels coursing in the mucous membrane were shown more distinctly by color enhancement in both patients. In the patient with right supraglottic cancer, the surface rough structure in the tumorous lesion was markedly enhanced by structure enhancement. The same rough structure was also shown in the contralateral ventricular fold.

Discussion : An electronic videoendoscope system was developed in which a small CCD chip was built in the tip of the endoscope portion as an ultra-miniature television camera. The laryngeal findings obtained with this system were clear and provide superior color reproduction even with ordinary dynamic color images. A special processing integrated circuit is now included in the EVIP-230 digital image

processor developed and marketed by Olympus Optical Co.,Ltd. Making it possible to connect it to the EVIS-200 system and to process dynamic images in real time. Therefore, laryngeal lesions were observed with the EVIS-200 system and real time digital image processing by the EVIP-230 was also performed in this study.

In both patients, the course of blood vessels was depicted by color enhancement. In the patient with supraglottic cancer, the marked surface roughness of the tumorous lesion, which was located in the right supraglottic area, was clearly depicted by structure enhancement. The same structure enhancement also revealed surface roughness in the left supraglottic area.

Based on the above, the electronic videoendoscopic examinations appeared to be extremely useful for endoscopically diagnosing laryngeal lesions. Moreover, in the patient with laryngeal cancer, it is possible to predict the site of cancer invasions with a certain degree of accuracy using the digital image processor in combination. This provides valuable information for choosing optimal treatment.