Application of laser endoscopy to
the treatment of elevated lesions

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An ordinary laser endoscope is a closed type of instrument having a tip of quartz fiber covered with a window. The quartz fiber tip is liable to be damaged by blood adhering to the surface of the window, resulting frequently in a breakdown of the scope itself. We have succeeded in putting the open type of endoscope to practical use by focusing laser rays with a lens on the tip of quartz fiber for photocommunication and by conveying them to the lumen of the forceps. This permits us to adjust the distance between the fiber tip and the target without setting the endoscope to the movement of the forceps. This permits us to adjust the distance between the fiber tip and the target without setting the endoscope to the movement of the forceps. The quartz fiber we use here measures 80 μ in diameter of the core and can conduct 50% of YAG laser rays and 80% of Ar laser rays. This technique can be applied not only to currently available gastroenteroscopes, whether they are of direct type or lateral type, but to bronchoscopes and cholangioscopes. Thus, the use of laser rays has remarkably been extended.

As a preclinical step, a fundamental study on the influence of laser rays on the gastrointestinal mucosa was performed in the dog and rat in comparison with high-frequency waves which we have long used. The results characterize this laser endoscopy as follows. First, laser rays can coagulate a limited area desired. Second, the time to regeneration of the mucosa coagulated and exfoliated by laser rays is decreased and requires only three days to a week of follow-up observation instead of one to two weeks' follow-up required after application of high-frequency waves. Thirdly, we can control, in the case of laser rays, the extent of mucosal injury that is in direct proportion to the output of and in inverse pro-

portion to the diameter of beam, while in the case of high-frequency waves, the extent of mucosal injury at a given output often varies by the surface of the mucosa exposed to the guide. Finally, laser rays are absorbed by blood and even if used at an increased output to ensure hemostasis of a lesion, there may be only a limited possibility of laser rays causing perforation. This is in contrast to high-frequency waves.

A laser is used for the treatment of elevated lesions either by conventional irradiation process or by the contact process in which the quartz fiber touches or punctures the lesion. It is expected that this contact process allows destruction of deep tissue of a large elevated lesion at a fixed output and duration of electrization. We can control the extent of destruction by stretching or shortening the fiber tip. Therefore, this process can be a more reliable method of coagulation of the center of a lesion rich in vessels.

On the basis of these results, laser cauterization was applied to 18 lesions of 12 patients with gastric polyp, 3 lesions of 3 patients with ATP, 11 lesions of 7 patients with polyp of the colon, 4 lesions of 2 patients with early gastric cancer and 1 lesion of 1 patient with cancer of the colon. The results were encouraging, especially against well-defined lesions. Postoperative ulcer disappeared in 3 weeks and we did not encounter with any accident. This technique can be used as a new promising treatment for inoperable cancer patients.