President Trehan, Dr. Pai, members and guests of the Association of Otolaryngologists of India. It is a great pleasure and privilege for me to have been selected as the 1975 Joshi Memorial Lecturer; I would like to express my appreciation to the Association for this honor that has been bestowed upon me.

I am fortunate in having had an opportunity to have seen the heritage that was left to Otolaryngology by Dr. Joshi at the K. E. M. Hospital, Bombay; the department in that institution and the many former students of Dr. Joshi who are now in positions of responsibility throughout India, are an everlasting memorial to his energy, foresight and excellence in Otolaryngology. The Association can be justly proud of Dr. Joshi's achievements.

Dr. Joshi was always interested in the advancing frontiers of Otolaryngology and I suspect that he would have approved of the topic that I have selected for his memorial lecture—Laser Surgery in Otolaryngology. It is a curious coincidence that the CO₂ Laser was discovered exactly ten years ago by Patel—a worthy son of India.

During the past three and one-half years the continuous wave CO₂ laser has been used to treat 200 patients with lesions in the head and neck; a total of 455 procedures was carried out. A large majority of the lesions were in the larynx.

By reviewing this experience it is now possible to identify situations where the use of the surgical laser is likely to be of advantage to the patient.

CO₂ Laser

A surgical laser was developed by the American Optical Corporation Laser Research Laboratories (1) and became available for surgical research in 1969; although the instrument which is currently in use is a prototype it is at home as much in the operating room as it is in the laboratory (Fig. 1). Electrical power is provided by the ordinary operating room outlet and a flow of tap water is used to keep the laser tube cool.
foot switch to start and stop the dissection. In contrast to pulsed lasers, the continuous wave CO2 laser has comparatively little impact-shock effects, so that it has minimal tendency to scatter soft tissue.

Methods of Delivery

The collimated beam that emerges from the articulated arm is unfocussed and has a diameter of about 10 mm. Using lenses of appropriate focal length, this beam may be focussed to a spot size of 0.5-2.0 mm.

For work on easily accessible areas such as the floor of the mouth a hand lens with a focal length of 14 cm. is available. The hand piece can be gas autoclaved and the articulated arm can be covered with a sterile stockingette prior to surgery, if asepsis is required.

The CO2 laser beam has a wavelength of 10.6μ in the infra-red region; its effect on tissue is therefore purely thermal and produces no ionization. At this wavelength, the energy is completely absorbed by all biologic tissues irrespective of pigmentation. The amount of tissue destruction is in part proportional to its water content.

The laser beam can be used to vaporize predetermined volumes of tissue in a precisely controlled fashion by using an appropriate amount of energy. A control knob sets the power level of the beam and a footswitch controlled interval timer operates the shutter allowing the beam to impact on the target area for an appropriate period. For precise microsurgery, a power setting of 15 watts is commonly combined with a time exposure of 1/5th of a second; for gross dissection 15-25 watts of power may be used quasi-continuously in the manual mode, bypassing the timer, using the

Fig. 1. The 50 W, CO2 laser with the micro-manipulator attached to the surgical microscope.

The microscope attachment is provided with an aiming light so that the invisible laser beam can be kept on the target area. The joy stick control on the attachment is coupled via a seven to one reduction lever to the laser beam aiming mirror; this mechanism provides micro-manipulation of the laser beam across the target area with exquisite precision (3).

A standard ventilating bronchoscope can now be fitted to the original prototype endoscope; this allows the focussing of the beam on lesions in the trachea and main stem bronchi under continuous monocular vision and two power magnification.

2 Ind. J. Otol. Vol, XXVII, No. 1, March, 1975