Serial Recording of the Depth of the Anterior Chamber of the Human Eye

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More recent opinions about hydrodynamics of the eye and, in particular, the fact that the vitreous humour is concealed behind a barrier of its own, have drawn attention to the possibility of increase or decrease in size of the vitreous body under the influence of a change in osmotic gradient.

One of the ways of testing whether these changes in volume actually do occur, consists in showing displacement, forward or backward, of the ocular diaphragm. As long as the diameter of the lens < is not changed by accommodation or drugs, this displacement can be measured from alterations of the depth of the anterior chamber.

Serial photography of the anterior segment of the eye with the Zeiss slitlamp and the accompanying Zeiss camera at two hourly intervals demonstrated variations in the distance between the anterior surfaces of cornea and lens with an accuracy up to 5/100 mm.

From diagrams of normal and glaucomatous people, it became evident that the variations in depth of the anterior chamber recorded in the course of one or several days, cannot be attributed to defective technique or changes in lens diameter, but must be considered to originate from displacement of the ocular diaphragm.

If the intraocular pressure is registered simultaneously with the anterior chamber depth, interesting information is obtained about what is going on inside the eye without appreciable disturbance of its proper function. This can be explained as follows:

The eye is divided into two parts by the ocular diaphragm. The volume of the anterior segment is mainly under the influence of the blood/aqueous barrier and the facility of outflow. The volume of the posterior segment is mainly made up for by the vitreous body governed by the vitreous barrier. In addition the vascular system may play a role in both, the anterior and the posterior segment.

Since a rise in intraocular pressure means a slight increase in the total volume of the eye, it can be stated that the anterior plus posterior segment grow slightly larger. If under these circumstances the anterior chamber deepens, the rise in pressure is mainly due to increase in volume of the anterior segment.

If during a period of rise in I.O.P. the anterior chamber depth diminishes, it must be the posterior segment that has grown larger.

Table I gives an impression of several possibilities.

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TABLE I

The combination of simultaneous recording of the intraocular pressure and of the depth of the anterior chamber provides information about what is going on inside the eye without disturbing its proper function

Diagrams of normal people revealed a close relation between the variation in depth of the anterior chamber and the diurnal variation in I.O.P.

From diagrams of some glaucomatous patients a twofold action of acetazolamide (Diamox) on the eye was demonstrated. In addition to an initial decrease of the amount of aqueous humour there was plain evidence of shrinking of the posterior segment under the influence of this drug. As this is only a preliminary report describing a new approach to the problem of maintenance of the I.O.P.

only the technique and the interpretation of data have been described. The results of experimental and clinical use will be dealt with in subsequent papers.