Ultrasonography and Lens Implantation

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In order to be able to determine the power of the implant lens pre-operatively, the following data should be available for both eyes: radius of the cornea, depth of anterior eye chamber, length of the axis, refraction. The question arises to what degree these data, all acquired before the operation, may be subject to certain variations as a result of the operation; to find an answer to this question, a number of eyes were treated by one and the same operator (Dr. C. D. Binkhorst) and followed up ad hoc: in 24 eyes the cornea proved to vary as follows: 8 times an increase of 0.3 D; 3 times a decrease of 0.45 D and 13 times no difference. The same comparison was made for the length of the axis in 26 eyes: 12 times no change, 11 times 0.2 mm increase after the operation, and 3 times a decrease of 0.2 mm. The reliability of the data with respect to the end refraction was checked in 31 eyes that could be measured accurately after the operation and in which, according to the manufacturer, the power of the implant was 19.50 D. In 23 cases there was an average difference of 1.2 D (to be interpreted as a greater value attributed to the axis length in relation to the real condition) and in four eyes an average difference of 0.60 D in opposite sense (shorter axis length measured than real) in another four eyes there was no difference. The possible sources of error are indicated.

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Discussion

Binkhorst: We are of course faced with cataractous lenses in which the velocity of the ultrasonic waves can be greater than in other clear lenses. Can colleague Leonard say what is the maximal error expressed in millimeters axis length?

Leonard: According to Jansson and others, the velocity in cataractous lenses may vary between 1,540 and 1,660 m/sec; this implies errors of 0.2-0.3 mm.

Binkhorst: There are still a few unmentioned problems in the determination of the optimal lens power. One of them is the prediction of the postoperative depth of the anterior eye segment. I have never seen any relationship with the preoperative depth. A suitable basis may be the distance from the corneal apex to the plane through the iris root. We placed a specially constructed small instrument, provided with a micrometer screw, at the level of the iris basis (visualized by diascleral trans-illumination) and brought it into contact with the corneal apex. So far the instrument has been used too little to evaluate its usefulness. The average of 2.8 mm, formerly found by me in 29 pseudophakous eyes, may be too low in the light of the present technique. Nowadays this average will be rather in the neighborhood of 3.2-3.5 mm.

Leonard: For the iris clip lenses there is a difference in anterior eye chamber between determinations in the sitting position, for example with the Jaeger, and in the lying position with

ultrasonography; several times we found 0.1 mm more anterior eye chamber in the lying position.

Franken: The most important source of repeating echos is the cornea itself. If water is used as contact medium in a glass cylinder for the lying patient, this source of interpretation difficulties can be eliminated by making the water column between transducer and cornea longer than the length of the ocular axis. Thus one is also freer in choosing the position of the transducer on the basis of the optimal echo intensity. A fixation light can also be offered by the building in of a small mirroring surface.

Leonard: A water column of more than 25 mm carried the disadvantage that the centering through a narrow pupil becomes more complicated in this position; a fixation point is of little use in cataract.