DIRECT OPHTHALMOSCOPY TOWARD THE RETINAL PERIPHERY: LENS POWERS REQUIRED

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Introduction

Direct ophthalmoscopic examination toward the retinal periphery requires the use of increasing amounts of plus lens power in the instrument. The purpose of this clinical study was to determine the amount of additional plus power required to focus on peripheral fundus details.

Method

A series of retinal photographs was taken of a patient's right eye. The patient is a healthy university student, aged 24. The photographs followed the four major divisions of the retinal blood vessels until the vortex veins were reached. A composite photograph was prepared, and three markers were placed at readily identifiable points in each of the four quadrants (see Fig. 1). Direct ophthalmoscopy was performed through natural pupils and each of the selected landmarks was located. The observer then determined the maximum amount of plus power which permitted a clear view of the selected fundus detail. This measurement was repeated 5 times for each landmark.

Results

The results are shown in Figs. 2, 3, and 4. The data points give the average ophthalmoscope lens power (relative to that used to view the optic nerve head) required to view the landmarks. Each number is the mean of 5 determinations. For example, an actual power of −2.5 D was required to view the nerve head and an actual power of +1 D was required to view the superior temporal vortex vein. The **change** in power required to view the superior temporal vortex vein, relative to the power required to view the nerve head, is +3.5 D, as shown in Fig. 2.

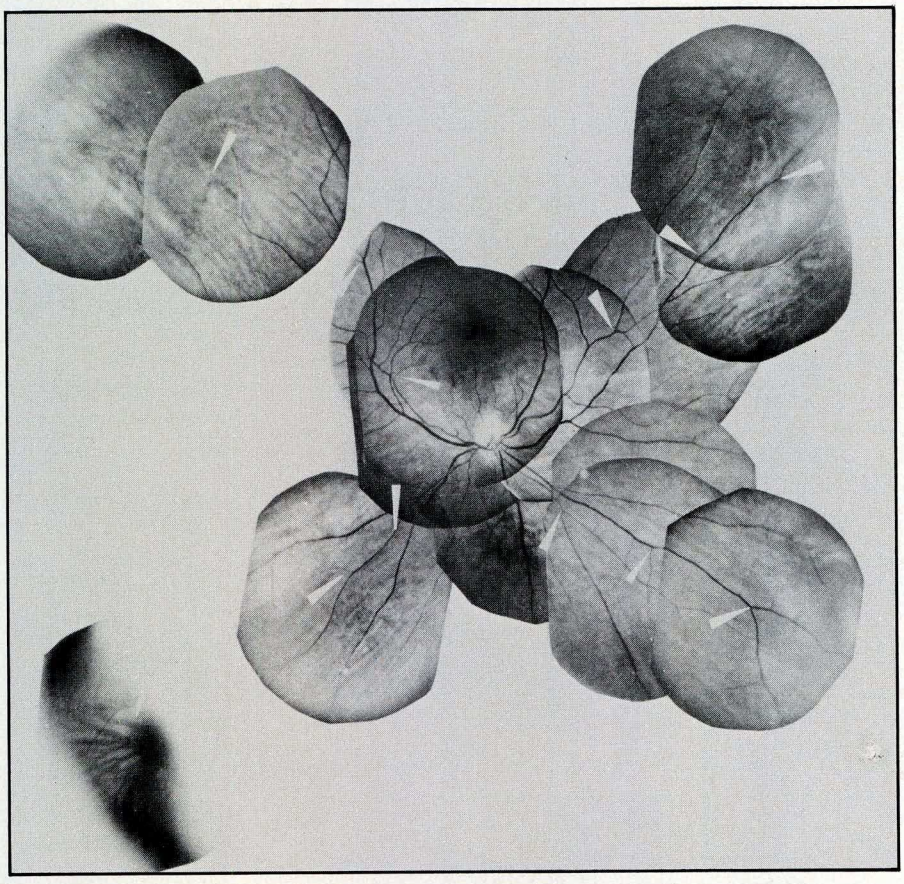

Fig. 1

Discussion

While it is known that the corneal and lenticular refracting powers change as one moves away from the visual axis, such changes are probably very slight for the markers closest to the nerve head. Moreover, it would be difficult to explain the results in Figs. 2, 3, and 4 on the basis of changes in the peripheral cornea and lens since the changes observed are not qualitatively similar in all four quadrants. Further, the refracting power decreases steadily as one considers increasingly marginal portions of the system, whereas the dioptric changes seen in three quadrants change from negative to positive as one moves toward the periphery.

It would appear that there is a lowering of the retinal level in three quadrants at approximately 15 degrees from the nerve head. This does not occur in the inferior temporal quadrant. The lowering of the retinal level in three quadrants in our patient is 1 to 1.5 D. The optic nerve would appear to have been pushed

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into the eyeball, although this would not be correct either embryologically (such pushing does not occur during the growth of the retina and optic nerve) or anatomically (there is normally a considerable slack in the optic nerve behind the eyeball).

The retinal periphery (up to the exits of the vortex veins) may be seen through natural pupils (at least in young patients). The amount of additional plus power required to view the retinal periphery is between 3 and 5 D for this patient, and this agrees with the experience of many clinicians. Lens power required for ophthalmoscopy in all four meridians are shown in Fig. 4. For this patient, the most steeply sloped quadrant was the superior nasal quadrant. The least steeply sloped quadrant was the inferior temporal quadrant. There appears to be little congruity among the quadrants, except for the final points measured in the inferior nasal, inferior temporal, and superior temporal quadrants.

For those clinicians who have always found a poor view of the vortex vein region, perhaps part of the difficulty is a failure to introduce enough additional plus power. For this study, the patient was instructed to turn his eye toward the quadrant to be examined, while the observer angled his view similarly, so the best possible view could be obtained. The peripheral retina does not appear much distorted, even though observed very obliquely through the pupil. It would appear that the system of patient's eye and direct ophthalmoscope (especially with a natural pupil) is not subject to the degree of marginal astigmatism which is predicted by many authors. Changes in spherical lens power give good resolution of retinal details which are at right angles to each other.

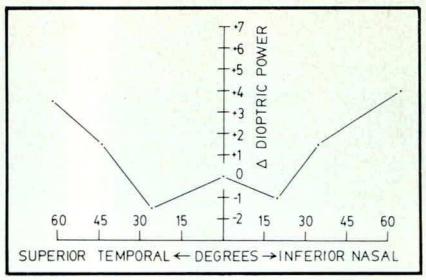

Fig. 2

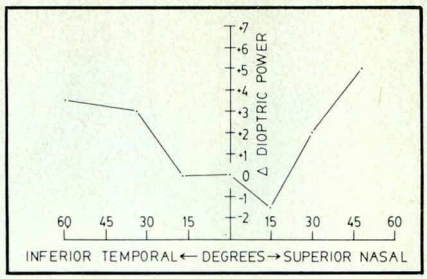

Fig.3

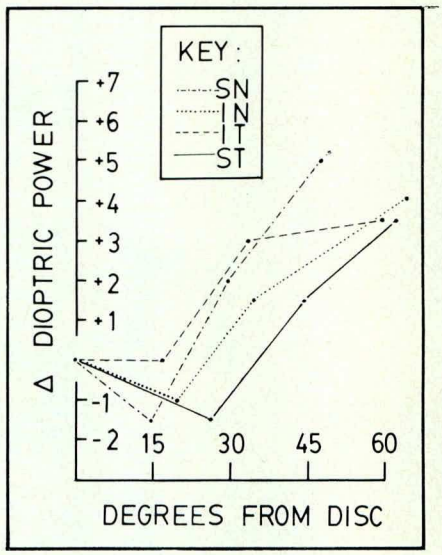

Fig. 4

Acknowledgements

We thank Dr. Brian Schmidt for his generous co-operation.

Canadian Ophthalmologists to work in Blindness Prevention Overseas*

Vancouver, B.C. - The Canadian Ophthalmological Society Executive, at the close of their Annual General Meeting in Vancouver June 12 approved a resolution authorizing a voluntary levy on its membership. The money raised, "will be paid into the C.O.S. fund for the advancement of vision and eye care, to be used in blindness prevention in the third world and disadvantaged areas."

The action by the C.O.S. followed a presentation by Professor Barrie Jones, London, England, on Trachoma to the more than 300 Ophthalmologists attending the conference. Professor Jones is a Director of the World Health Organization Collaborating Centre for Reference and Research on Trachoma and other Chlamydial Infections.

Trachoma is the major cause of blindness world wide. The organism is a leading cause of infection in urinary and genital systems in both males and females. There are many forms of the organism, some of which are specific to the eye, others to both the eye and uro-genital systems. Trachoma has also been linked to an arthritic associated condition, known as Reiter's Syndrome.

Trachoma exists in North America and is a cause of eye infection in some North Americans but seldom causes blindness. In underdeveloped countries due to constant reinfection, often spread by flys, it is the leading cause of blindness.

Dr. Jones has had first hand experience with Trachoma in West Africa, Iran and Indonesia. One village in Iran he visited had an overall incidence of blindness of 9%, two thirds due to Trachoma. A corresponding North American population would have .02% of the population blind from all causes of blindness.

Trachoma is an easily treatable condition. Large numbers of people can be treated at low cost. The problem in many areas of the world is a shortage of trained manpower and limited funds. "Through the levy and our research fund we will be able to provide financial support for Canadian Ophthalmologists to travel to these countries and supply them with the necessary drugs to combat this dreadful disease", said Dr. Clive Mortimer, the newly elected President of the C.O.S.

*Release from the Canadian Ophthalmological Society.