SYMPOSIUM ON PITUITARY TUMORS—II

OPHTHALMOLOGIC CRITERIA IN DIAGNOSIS AND MANAGEMENT OF PITUITARY TUMORS*

MAX CHAMLIN, M.D., AND LEO M. DAVIDOFF, M.D.

Departments of Ophthalmology and Neurosurgery, Albert Einstein College of Medicine, Yeshiva University, Bronx Municipal Hospital Center and the Montefiore Hospital, New York, New York

(Received for publication June 1, 1961)

In 1955 Chamlin, Davidoff and Feiring6 made a study of the ophthalmologic changes in 156 cases of pituitary tumor. They found that visual-field defects (bitemporal hemianopia or some variant thereof) were found in 86 per cent of all patients with pituitary tumors and craniopharyngiomas, while in cases of chromophobe adenomas they were found in 96 per cent. Optic atrophy was present in 50 per cent and loss of visual acuity in 32 per cent. Other ophthalmologic changes were of a relatively infrequent nature. For example, palsy of extraocular muscles was found in 5 per cent, and pupillary changes, involvement of 5th nerve, papilledema and proptosis, in even lesser numbers. Since the true existence of optic atrophy can be substantiated only by disclosing a visual-field defect, and since the loss of visual acuity depends on the loss of central vision, it may well be said that both optic atrophy and loss of visual acuity are functions of visual-field impairment. Visual-field loss, therefore, stands out as the most frequent and outstanding ophthalmologic feature of pituitary tumors, particularly chromophobe adenomas. Visual-field defects may indeed be found in the absence of other convincing neurologic or endocrinologic symptoms and signs or even roentgen evidence of pituitary tumors.

In 1950, Chamlin and Davidoff7 studied the importance of the 1/2000 field in cases of chiasmal interference. At that time they found that the 1/2000 field was the first to show bitemporal defect and the last to lose it after successful treatment, either surgical or roentgenologic. They also found that, whatever the peripheral defect was, the 1/2000 field always showed at least as much involvement and usually much more. Finally, it was shown that the 1/2000 field practically always showed some defect before central visual acuity was affected.

In a review of the existing literature at that time, it was found that many of these seeming discoveries were only re-discoveries of facts that were already known to Clifford B. Walker in 1915. In his classic paper entitled “A Contribution to the Study of Bitemporal Hemianopsia . . .”7 he pointed out very much the same findings. At that time he urged the use of a wide range of test objects in order to pick out the extent of involvement of the various portions of the field, and bemoaned the fact that most ophthalmologists were not using enough test objects, largely because of the time and effort involved.

Today, virtually the same principles hold true and most ophthalmologists still seem to be much too busy to do a complete set of visual fields with each of many test objects. Therefore, in 1952, the present authors8 described the use of a series of test objects with which to qualify a defective field, without necessarily repeating the entire visual-field study for each of these test objects. When a visual field was found to be defective for the usual small test object such as 2/330

* Presented in part at meeting of the Harvey Cushing Society, Mexico City, Mexico, April 18, 1961.
white, or even $1/2000$ white, instead of using a larger test object and again outlining the entire visual field, larger and larger test objects were displayed in the defective areas only until one was found that could be visualized in this area, and this was so recorded. While this may not show all the minute details of the quality in each meridian, for practical or clinical purposes, it gives as much information as is necessary for the proper control of cases of chiasmal interference (Fig. 1).

When the peripheral fields, for example $2/330$ white, and the central fields, for example $1/2000$ white, have thus been studied and the defective areas qualified, one may then, in most cases, be satisfied that one has an adequate evaluation of the entire visual field.

However, in some cases of very minimal chiasmal interference, it is sometimes not sufficient to limit oneself to these two isopters. Thus, it has been found that if the isopter for $1/2000$ does not extend beyond $10^\circ$, a temporal hemianopic defect, particularly above, may be picked up with $2/300$ white, a slightly more peripheral isopter. Also, while $2/330$ may not disclose a defect, $1/330$, a slightly less peripheral isopter, may do so (Figs. 2 and 3). In other words, the intermediate field somewhere between the overlapping limits for the tangent screen and the perimeter may disclose a minimal defect. The defect may be small enough so that minimal techniques such as simultaneous stimulation may be necessary to bring them out.1

The full extent of the field as well as the quality of the defective field is important not only from a diagnostic point of view, but also as a means of following the cases clinically and evaluating the progress in regard to the response to treatment, either surgical or radiological.

Thus, in a case of chiasmal interference such as is caused by chromophobe adenoma, in order to know whether surgery or more particularly roentgen-ray or cobalt therapy has produced a reasonable degree of improvement, visual-field studies are important because it is largely by the changes in the visual field that one can judge the effect of therapy.

The use of colored test objects, while helpful to corroborate the presence of a defect or to qualify the depth of a defect in comparison to another area, is not as reliable for reproducibility and exact estimation of size of field, especially when such exact measure-

---

**Fig. 1. A. Use of multiple isopters. Peripheral fields for 5/330, 3/330, 2/330 and 1/330. Central fields for 5/2000, 2/2000 and 1/2000; in right eye also for 10/2000. B. Same fields utilizing only one isopter for the periphery (2/330) and one isopter for the central field (1/2000) and qualifying the defective areas of the field.**

(These fields do not represent a case study, but are hypothetical and used only to demonstrate the method.)