

Gliosis-Like Retinal Alterations in Glaucoma Patients

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Summary: Morphological alterations resembling fine epiretinal gliosis in the midperiphery of the retina of glaucoma patients were examined biomicroscopically. Examination with a laser-scanning ophthalmoscope (Zeiss CLSO) incorporating an argon laser confirmed sharply bordered, patchy retinal alterations in the superficial layers. These alterations were predominantly in the Bjerrum area but did not conform to the shape of the nerve fiber bundles. Patchy retinal alterations were found to be absent or rare in nonglaucomatous controls (0 of 15 controls) but to occur quite often in people with glaucoma. Although all glaucoma patients examined had typical optic nerve heads and visual field damage, the prevalence of patchy retinal alterations was especially high in the group with progressive damage despite successfully reduced intraocular pressure (13 of 15; 86.7%); the alterations were only slightly less prevalent in the normal-tension-glaucoma group (11 of 16; 68.8%). **Key Words:** Gliosis—Laser-scanning funduscopy—Patchy retinal alteration—Glaucoma.

In glaucoma patients, we observed retinal alterations that are only very rarely seen in healthy people. Biomicroscopically, discrete, glinting, patchy alterations in the superficial layers of the retina were seen. We refer to this finding as "patchy retinal alteration" (PRA). PRA resembles a mild epiretinal gliosis (1-9) but normally spares the macula, occurring mostly in the Bjerrum area. Patients with PRA have no metamorphoses. To the best of our knowledge, such glaucoma-associated alterations have not been previously described.

Although PRAs can be seen ophthalmoscopically, they are better visualized under laser-scanning funduscopy using a green argon laser (Zeiss CLSO; Fig. 1A). On color fundus photographs (Fig. 1B), PRAs are barely visible.

The aim of the present study was to evaluate the frequency of PRAs in primary open-angle-glaucoma

(POAG) and normal-tension-glaucoma (NTG) patients and to compare these two groups with nonglaucomatous controls.

PATIENTS AND METHODS

Included in the study were patients who fit in one of the following groups: (a) POAG patients, medically or surgically well-controlled with nonprogressive visual field defects for at least 5 years; (b) POAG patients with progressive visual field defects despite controlled intraocular pressure (IOP) but having other risk factors, such as arterial hypotension, vasospasm, or a history of myocardial infarction; (c) NTG patients (10) (mean IOP, <21 mm Hg; IOP peaks, <24 mm Hg on a diurnal pressure curve); and (d) patients presenting for reasons other than glaucoma, such as conjunctivitis or pseudophakia.

Pupils were dilated with tropicamide, and fundus examinations were done with a 90-D lens at the slit-

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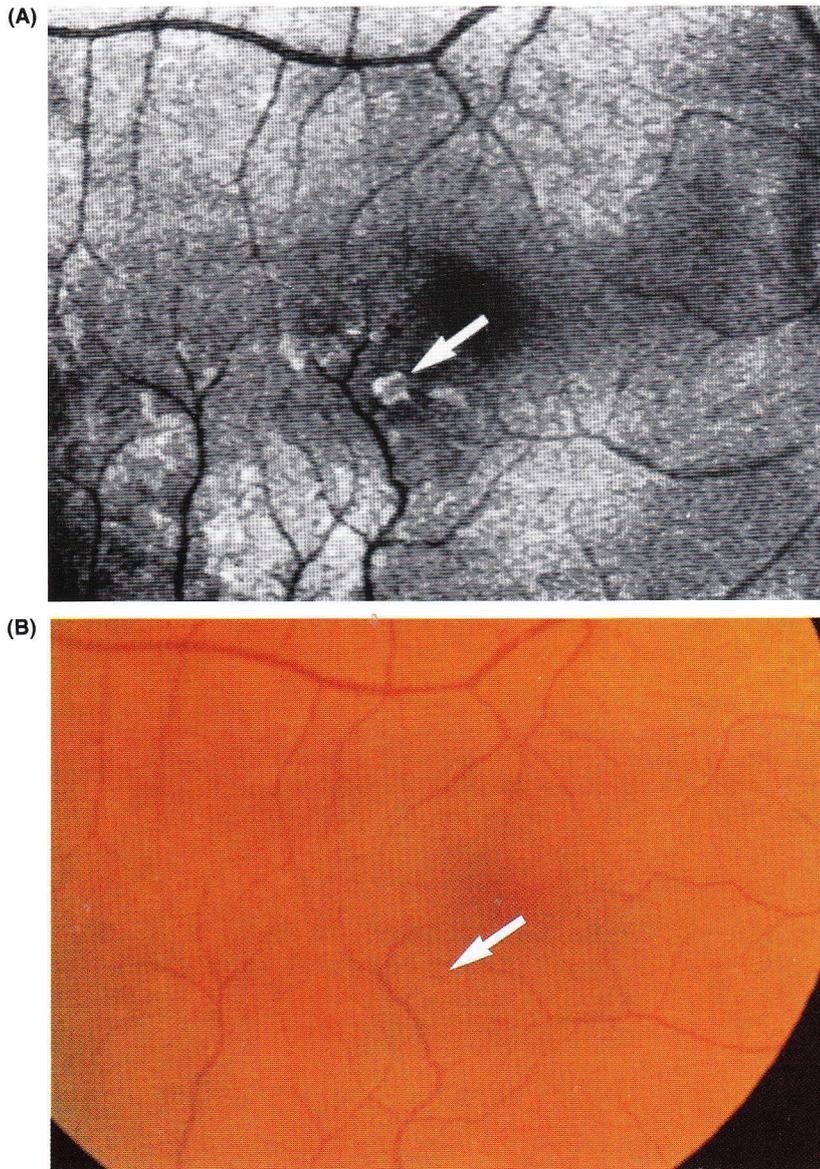


FIG. 1. A: Laser-scanning ophthalmoscopic image of the macula area of the right eye of a 66-year-old female patient. The arrow indicates one prominent gliosis-like alteration. **B:** The same area of the same eye photographed with a fundus camera. The arrow indicates the same retinal site as in Fig. 1A, but the retinal alteration is scarcely visible.

lamp by two independent, diagnostically masked observers. When both observers found a PRA in at least one eye, the patient was termed "positive." In only one patient did the observers disagree.

Although not available for all patients in this study, whenever laser-scanning funduscopy using a green argon laser (Zeiss CLSO) was done it confirmed the accuracy and validity of the biomicroscopic impression. Attempts to diagnose PRA on monoscopic fundus photographs (Fig. 1) revealed their inadequacy in this regard, and these were soon abandoned in favor of direct stereoscopic biomicroscopic fundus examination.

RESULTS

The frequency of PRA positives was 14.3% (2 of 14) in group a, 86.7% (13 of 15) in group b, 68.8% (11 of 16) in group c, and 0% (0 of 15) in group d (Table 1). A χ^2 test revealed statistically significant differences between groups a and b, between groups b and d, and between groups c and d.

DISCUSSION

In some glaucoma patients, we observed patchy alterations (PRAs) localized at the posterior pole,

TABLE 1. Breakdown of study groups

Group	Description	PRA-positive subjects	Total subjects	Percentage
a	POAG, well-controlled IOP, nonprogressing visual-field damage	2	14	14.3
b	POAG, well-controlled IOP, progressing visual-field damage	13	15	86.7
c	Normal-tension glaucoma	11	16	68.8
d	Other complaints, no glaucoma	0	15	0

mostly in the Bjerrum area. At present we do not know the exact nature of such alterations, although they could be related to drusen of the retinal pigment epithelium. The appearance of PRAs is similar to that of slight epiretinal gliosis, but we cannot rule out simple optical causes, such as certain reflexes. The borders of PRAs do not conform to the shape of the nerve fiber bundles.

Whatever their nature, the prevalence of PRAs was significantly higher in POAG patients with progressive visual-field damage in spite of successfully reduced IOP than in POAG patients whose damage has been stabilized. The two groups differed mainly in that POAG patients with progressive damage had other vascular risk factors (11,12). The prevalence of PRAs was also higher in NTG patients than in nonglaucomatous controls.

CONCLUSION

Although our grouping is somewhat arbitrary and not very well-defined, it reveals that the prevalence of PRAs may not be the same in all types of glaucomas. Therefore, PRAs are most probably not just

another representation of the well-known nerve fiber bundle defect. Instead, they may represent another type of damage that, for some reason, occurs more often in progressive glaucoma patients. PRAs might be related to circulation problems, although we are not able to prove this at present. PRAs have some similarities to idiopathic preretinal gliosis, which seems to be related to ocular ischemia. Further study is needed to reveal the nature of such alterations.

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