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THERAPEUTIC EFFECT OF PAN-RETINAL PHOTOCOAGULATION IN AN OLD RETINAL BRANCH VEIN OCCLUSION WITH NEW DISK VESSELS

(photocoagulation/retinal branch vein occlusion/new disc vessels)

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Pan-retinal photocoagulation was performed in a patient with a retinal branch vein occlusion with neovascularization of the disk and retina. The new disk vessels disappeared four weeks after photocoagulation and though there was no sign of recurrence six months later, the new retinal vessels remained to some extent.

Neovascularization is a common symptom of retinal branch vein occlusion and is the main cause of vitreous hemorrhage, after which visual acuity is seriously affected. For prophylactic treatment, retinal photocoagulation using various techniques is often done. The effect of photocoagulation on new vessel growth, especially new vessels in the disk is a controversial problem.

We obtained a significant effect of indirect photocoagulation, namely, pan-retinal photocoagulation (PRP) in a patient with an old retinal branch vein occlusion and neovascularization.

CASE REPORT

The patient was a 68 yr-old male farmer who was initially diagnosed in our clinic on Dec. 10, 1980. The primary complaint was left visual disorder and myodesopsia.

History prior to diagnosis in our department: The patient consulted an ophthalmologist in autumn, 1977, because of a sudden loss of visual acuity in the left eye. Bleeding in the left

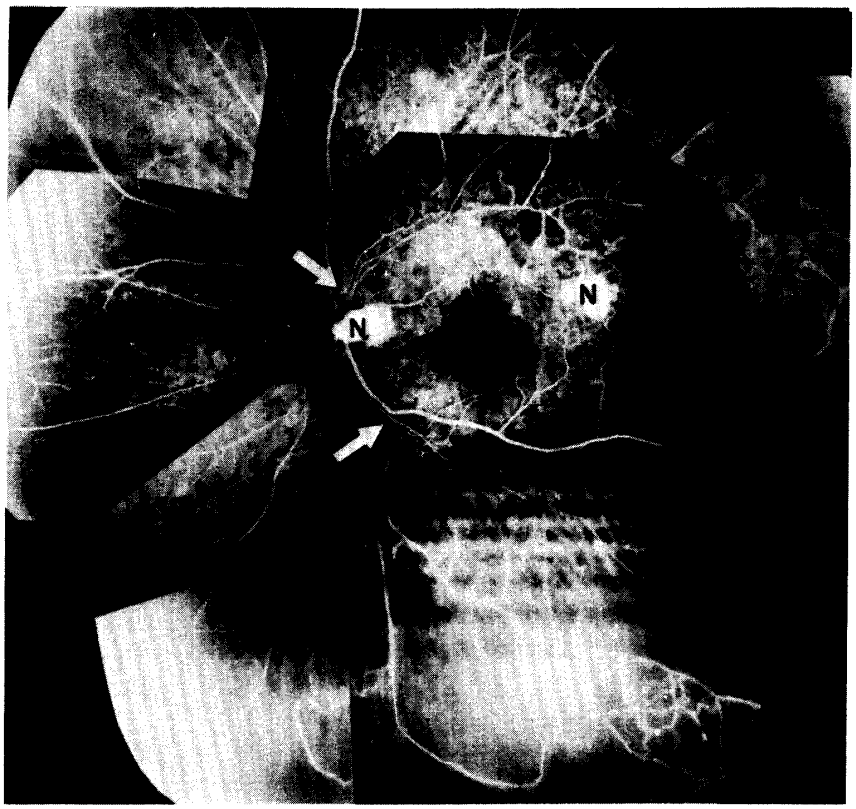

Fig. 1. Venous phase of fluorescein fundus angiogram of the left eye before photocoagulation. Site of retinal branch vein occlusion is indicated by arrows. Neovascularization (N) is evident in the temporal optic disc and the supra temporal paramacula. Extensive areas of capillary nonperfusion (CP) are present with attendant abnormalities of microvasculature (microaneurysma, capillary dilatation, arteriovenous shunt, etc.).

fundus was diagnosed and after conservative treatment for two months, he recovered. He noticed a transient misty vision in the left eye in Jan, 1980 and this persisted for several months. When myodesopsia developed he visited our department.

Past history: Surgery for gastric ulcer in 1979.

Family history: Non-contributory.

Ophthalmologic examination at initial diagnosis: The visual acuity was 0.6 (0.9 X +2.0D) OD and 0.2 (0.9 X +2.0D) OS. The intraocular pressure was 14 mmHg OD and 11 mmHg OS.

Both eyes presented nothing remarkable in the exterior and the optic media. Funduscopic examination showed only a slight sclerotic change of the vessels in the right eye, whitening of the retinal branch vein superiorly and inferiorly to the temporal side, occlusion and collateral pathways at the crossings near

Fig. 2. Eye in Fig. 1 six months after photocoagulation. Numeral chorio-retinal scars are seen on peripheral and posterior polar regions. Note the reduction of neovascularization and the diminution of dye leakage from new vessels.

the optic disk and fibrotic neovascularization penetrating the vitreous from the retinal surface on the upper temporal side of the disk and macula in the left eye.

General examination at initial diagnosis: The blood pressure was 138/80 mmHg, and pulse 61-70/min with sinus arrhythmia. Laboratory data included, urinary sugar (-), urinary protein (-), WBC 3600, RBC 513 X 10^4, Hb 15.3 g/dl, Ht 45.9%, PLT 15.5 X 10^4, TP 7.2 g/dl, Alb 4.7, A/G 1.9, T-Bil 0.9 mg/dl, TG 100, T-Cho 173, F-Cho 45, ESTER-R 74, blood sugar 93 mg/dl, CRP (-), Wa-R (-) and HB (-).

The blood coagulation and fibrinolysis test results were all within the normal range.

Therapeutic results: Although the patient was followed from immediately after the initial diagnosis until June, 1981 and then, vasodilators and hemostatics were prescribed, the new vessel growth persisted and the myodesopsia became aggravated. Fundus color photographs and fluorescein angiograms of the left

eye were prepared over the widest possible range with a Canon CF-60Z (Fig.1). On the basis of these findings, two sessions of PRP with argon laser (Britt) were carried out under conditions of 100-200μ in diameter, 0.1 sec and output 0.4W on June 18 and 25 to deliver a total of 789 coagulations to the retina. In the first session, 340 coagulations were relatively sporadially applied mainly in approximately one quadrant of the retina covering the region of retinal vein occlusion on the upper temporal side including the peripheral non-perfused area. In the second session, 449 coagulations were scattered mainly in the lower temporal quadrant to the upper nasal quadrant which contain relatively many non-perfused areas. Four weeks later, the new disk vessels had almost disappeared and six months later, although retinal neovascularization persisted to some extent, there was no sign of recurrence of new vessels (Fig.2).

DISCUSSION

Our patient, first seen in 1978 falls in with category 4 of the classification of Archer et al. (1) with evidence of ischemic lesions and multiple occlusions distal to the branch vein occlusion in the upper and lower temporal quadrants. The peripheral retina to the nasal side of the disk, though appearing to be intact (direct funduscopic examination), actually revealed noteworthy findings such as microaneurysma, localized vasodilatation and slight fluorescein dye leakage with general insufficiency of circulation in the entire fundus.

Wise (2), Ashton (3) and Kohner et al. (4) suggested that the effect of vaso-proliferative factor was related to the hypoxic retinal tissue, in association with new vessel formation. Archer et al. (1) noted in fluorescein fundus angiograms that new vessel formation was closely associated with the capillary non-perfusion area. Although it was fairly certain that the new vessels in the disk originated from the choroidal vessel (5), it was suggested that the extensive non-perfused areas formed only part of the mechanism involved in the development. However, the extensive presence of a non-perfused area with the formation of new disk vessels seems definite. It is thus considered reasonable that other workers achieved regression or disappearance of the new vessels by extensive application of indirect photocoagulation (including

PRP) in capillary non-perfused areas of the retina (1, 6-9).

Direct coagulation is another technique used for such new vessels. This, however, not only requires special skills and repeated coagulation but also produces a lesser effect on fibrovascularization or new vessel formation, at the fibrous stage and which penetrates the vitreous, such as was the case with our patient. In view of the above finding and also the presence of lesions, extensively in the fundus, PRP (or selective PRP) was the method of choice.

Laatikainen (7) stated that successful results are unobtainable with indirect photocoagulation unless the entire areas of non-perfusion are covered. Oinaka et al. (8) also stressed the need for treating the entire avascular areas of the retina. Although most of the new vessels of the disk disappeared in our patient 6 months after coagulation, a few of the new retinal vessels remained, thus indicating an incomplete coagulation in the non-perfused area in the lower periphery of the retina. Our patient is being closely followed and additional coagulation will be done, if necessary. Strict avoidance of excessive coagulation and also of the normal areas of the retina is another important factor to consider in photocoagulation treatment. Concomitant new vessel formation is frequently accompanied by an underlying lesion infiltrating the entire fundus. Thorough examination by fluorescein fundus angiography revealed a lesion in the retinal area. As stated by Muraoka et al. (10), panoramic fluorescein fundus angiography in an extensive range is considered indispensable for diagnosis and treatment of this disorder.

Our patient had no subjective complaints and disturbances of the visual field and of adaptation to the dark were slight. Perimetric examination by an intermediate isopter (I/3, I/4) showed only a depression on the nasal side.

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