



MODERN TREATMENT METHODS FOR CHRONIC ISCHAEMIC OPTICAL NEUROPATHY OF VASCULAR ORIGIN

Abdusalamova Azizakhon Ibrohimjon kizi

Resident of master's degree in ophthalmology department
Andijan State Medical Institute
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ABSTRACT

Vascular diseases of the optic nerve are one of the most important problems of ophthalmology. In spite of the undoubted progress achieved in the recent decades in diagnostics and treatment of ophthalmological diseases the number of patients with optic nerve affection of vascular genesis is increasing. Modern methods of treatment of chronic ischemic optic neuropathy of vascular genesis are analyzed in the article.

Introduction: According to foreign and domestic data, the disturbance of blood circulation in the vessels feeding the eyeball is associated with pathology of the cardiovascular system. This condition is often accompanied by chronic cerebral insufficiency, coronary heart disease, arterial hypertension, i.e. diseases whose pathogenesis is based on ischemia. Lack of timely prevention and treatment of pathology of the cardiovascular system leads to ischaemia and hypoxia of the eye membranes and, consequently, to visual impairment. Despite significant progress in the prevention and treatment of cardiovascular disease, 17.9 million people died from this pathology in 2016. Of these deaths, 85% were due to a heart attack or stroke. Partial optic atrophy in the visually impaired, not resulting from glaucoma optic neuropathy, accounted for 14%. Therefore, the issue of chronic vascular optic nerve failure remains highly relevant. In 2021, I.A. Eremenko proposed to classify chronic vascular optical neuropathies into chronic vascular optic neuropathy, simple sclerotic optic atrophy and sclerotic optic atrophy with pseudoglaucomatous excavation. In chronic vascular optical neuropathies, the disease begins gradually, often unnoticed. The initial stage of the disease - chronic vascular insufficiency of MN ophthalmoscopically manifests as slight pastosity of MN disc with insignificant stippling of its borders. Peripapillary choriofibrosis in the form of an atrophic rim is noted. Retinal angiosclerosis, sclerotic maculodystrophy (more often dry) are detected at the same time. The visual function is high: in 50.6% of cases, 0.6 to 1.0, concentric narrowing of the visual field by 20-30 . Gradually (over several years) the process advances to the next stage - sclerotic atrophy of the TM, which is accompanied by a progressive decline in visual function. Simple sclerotic atrophy of ST is characterized by the appearance of monotonous pallor of the disc, clear borders. Peripapillary atrophy of vasculature, often sclerotic maculodystrophy is noted in 81.8% of patients. Visual acuity is within 0.3 ± 0.09 ,

field of vision narrowed to 40-25. Sclerotic atrophy of PN with pseudoglaucomatous excavation reminds a glaucoma picture: disc gets greyish tint, there is extensive, up to 1/2-3/4 PD, undermined excavation and vessels shift to the nasal side. In 75.3% of cases, there is marked sclerosis of the vasculature in the posterior pole, para-equatorially and around the disc. Visual acuity is usually less than 0.1-0.3, with a concentric narrowing of the visual field as high as 30-15. The examination for glaucoma excludes it. Simultaneously, as in simple sclerotic atrophy of MN, a decrease of diastolic pressure of the central retinal artery, rheoencephalographic and ophthalmographic coefficients are observed. Apparently, the degree of hemodynamic disturbances in small postlaminar vascular branches and imbalance between the blood supply of the ST disc and the level of intraocular pressure (even when the latter value is normal) play a crucial role for the occurrence of pseudoglaucomatous excavation. Conservative methods of treatment of chronic ischemic optical neuropathy have been known for a long time and are aimed at reducing local ischemia and hypoxia. Currently, metabolic, vasoactive drugs, neuroprotectants, angioprotectors and correctors of microcirculation, antioxidants and nootropic drugs, as well as antioxidant vitamin-mineral complexes are widely used. However, conservative treatment cannot fully and consistently compensate for lost visual function. The ephemeral nature of conservative therapy and physiotherapeutic methods has prompted ophthalmologists to search for the most effective ways to improve ocular circulation. Various surgical methods were developed to correct ocular circulation disorders, which improved hemodynamics of the retina and ST. Modifications of ocular revascularization operations aimed at the creation of additional collateral blood supply of the eye inner membranes were widely spread. The operations were carried out using oculomotor muscles, episcleral flap, pieces of donor sclera, viscoelastic, with the introduction of neuroprotective and vasoactive drugs, subtenon implantation of collagen infusion system. The duration of the therapeutic effect was up to six months.

A.I. Eremenko applied prolonged intracarotid drug infusion in chronic vascular optical neuropathy: Through a catheter inserted into the superficial temporal artery (PVA) up to the carotid bifurcation, a multicomponent infusion (daily dose included 1000.0 saline, 15.0 - 2% trental, 15,000 units heparin, 15.0 - 2.4% eufillin, 40 mg prednisolone, 150.0 - 0.5% novocaine) was given for 5-7 days around the clock. On a background of such infusion there was an increase of visual functions in 92,3% of patients (at simple sclerotic atrophy of ST: Vis - by $0,15 \pm 0,02$, visual field - by $68,8 \pm 14,9^\circ$; atrophy with pseudoglaucomatous excavation: Vis - by 0.11 ± 0.03 , field of vision - by $65.1 \pm 18.2^\circ$; in the control group: Vis - by 0.05 ± 0.01 and field of vision - by $22.5-25.1^\circ$ in 47.1% of observations). However, it is difficult to judge the effectiveness of this method, as there are no long-term follow-up results for the patients of this group.

Y.K. Kijko et al. used cervical vagosympathetic block by A.V. Vishnevsky in clinical practice. It is shown that this method has a positive effect on visual function in patients with impaired blood circulation in MN and its sclerotic atrophy. Nevertheless, it would be inappropriate to speak unequivocally about the advantage of the method in chronic optical neuropathy, as the effectiveness of the method was evaluated in a mixed group of patients. Electrophoresis with Ganglerone on the upper cervical sympathetic nodes was used as an alternative method in sclerotic PN atrophy. A short-term positive therapeutic effect was observed. The authors also proved that phlebodestruction surgery is

ineffective and impossible in internal carotid artery pathology.

E.I. Sidorenko observed improvement of visual function in 76.2% of patients using carbogen in the complex treatment of acute and chronic optical neuropathy. Carbogen therapy eliminates metabolic acidosis and is considered to be a good adjunctive method in the complex treatment of chronic vascular neuropathy.

In addition to trophic therapy, light therapy, ultrasound therapy, phonophoresis with taufon, amplipulse electrophoresis, and acupuncture are successfully used in MN atrophy. However, these methods also do not provide an effective and long-term therapeutic effect.

O.I. Karushin noted improvement of visual functions in 64.1% of patients during complex treatment of MN atrophy, which included MN revascularization surgery, percutaneous electrical stimulation of MN and psychophysiological methods of vision correction. In addition, percutaneous electrical stimulation of MN was used as a separate treatment for MN atrophy. However, improvement of visual functions was recorded in only 30% of patients. N.F. Korosteleva et al. performed PVA crossing surgery in dystrophic retinal pathology of various genesis, amblyopia, atrophy of the MN of ischemic, glaucomic and traumatic nature. As a result, a positive effect was observed. At the same time, according to A.I. Eremenko et al. , PVA crossing did not result in improved visual function in any of 140 patients with vascular optical neuropathy. In addition, G.A. Shilkin et al. found that improvement of blood flow in the vasculature in 76% of patients after PVA crossing was not always accompanied by improvement of hemodynamics in the ocular artery (confirmed by Doppler imaging), which, in our opinion, may be the consequence of concomitant drug therapy. Novocaine blockade of the sinocarotid zone (SCZ), as well as novocaine blockade of PVA, leads to improvement of cerebral and ocular circulation. However, NSAIDs should not be used if there are marked cardiac changes with decompensation of the general haemodynamics. A number of publications have reported that carotid endarterectomy (CE) is most effective compared to conservative treatment in patients with clinically significant carotid artery occlusion and concomitant ocular ischaemic syndrome (OIS). CE was accompanied by statistically and clinically significant improvement in visual status. This conclusion was made by A.V. Gavrilenko et al. who compared the effectiveness of surgical (SE) and conservative treatment in patients with atherosclerotic carotid artery occlusion and acute visual impairment (acute type of GIS course).

The results of this study demonstrated functional improvement of the visual organ after surgery in patients with carotid artery occlusion and acute visual impairment. In another study, the authors compared the effectiveness of surgical (SE) and conservative treatment in patients with atherosclerotic carotid artery occlusion and chronic visual impairment (the primary chronic type of GIS). During the study, a reduction in ophthalmological and neurological symptoms after CE was recorded, which was expressed in a statistically significant reduction of symptomatic patients. A cessation of transient monocular blindness (amaurosis fugax) was also observed after CE.

Gavrilenko et al. analyzed the results of treatment of patients with transient monocular blindness (amaurosis fugax) against the background of carotid artery occlusion. Significant improvement of visual status against the background of carotid artery occlusion after CE was shown.

Reconstructive surgery on the carotid arteries in patients with pathological tortuosity of the carotid arteries is highly effective. After surgery, there is an improvement in visual acuity, widening of visual fields, disappearance of scotomas and stopping of maculodystrophy processes. In a recent study, Y. Yang et al. evaluated the clinical effect of enhanced external counterpulsation (EACP) combined with medication in patients with carotid artery stenosis and concomitant ischaemic eye disease. Patients who received UNKP in combination with medication, in contrast to patients taking medication alone, had a significant improvement in visual acuity, visual fields and optical hemodynamics. This suggests that UNKP can be used to reduce symptoms and improve vision.

Many ophthalmologists pay special attention to the improvement of old and development of new methods of surgical treatment of ischemic processes in the eye. The use of a number of techniques in the comprehensive treatment of ischaemia and its sequelae can improve the haemodynamics of the eye and preserve visual function.

Conclusions: Thus, analysis of the literature data concerning the treatment of chronic ischaemic optic nerve disease shows that there are a number of issues in this field that require further study.

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