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Micropulse Transscleral Cyclophotocoagulation in Combination with Anti-Vegf Therapy in Patients with Neovascular Glaucoma

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Annotation. Neovascular glaucoma (NG) is one of the severe, prognostically unfavourable forms of glaucomatous process developing due to different pathologies, but the main causes are proliferative diabetic retinopathy, central retinal vein thrombosis, as well as chronic uveitis and traumas of the visual organ..

Keywords Neovascular glaucoma, glaucomatous process, proliferative diabetic retinopathy

Introduction

Hypoxia of the inner retinal layers leading to the production of angiogenic factors, in particular vascular endothelial growth factor (VEGF), inducing neovascular proliferation, Newly formed vessels due to incomplete endothelial coating have thin wall and have high haemorrhagic activity, which becomes the cause of inflammatory and haemorrhagic complications during surgical treatment of NG. Appearance of anti-VEGF-drugs inhibiting the growth and obliteration of newly formed vessels (Lucentis) is a new step in the treatment of HH.

Purpose of the study: To evaluate the efficacy of MTCFC in combination with anti-VEGF-therapy (Lucentis) in patients with neovascular glaucoma.

Material and methods of the study. 40 patients (40 eyes) were under observation. Of them 18 men and 22 women, aged from 49 to 79 years, the average age was 62,9±8,3 years. Type I diabetes mellitus (DM) was suffered by 5 patients, type II insulin-demanding form - 35. Proleiferative diabetic retinopathy was diagnosed in 25 eyes and retinopathy after central retinal vein thrombosis in 15 eyes. All patients underwent standard ophthalmological examinations: visiometry, ophthalmotonometry, biomicroscopy, ophthalmoscopy, UBM of the eyes.

Lucentis' was used as an anti-VEGF preparation, which was injected intravitreally and into the anterior chamber in the operating room after instillations of anaesthetic Alkaine and disinfectant (5% povidone-iodine solution), the surgical field was treated three times and an eyelid extender was applied. In 3.5-4 mm from the limbus, after preliminary displacement of the conjunctiva in the place of supposed injection, a needle was inserted into the vitreous cavity towards the centre. Lucentis was injected into the anterior chamber through paracentesis performed with a 19G knife.

All patients underwent MTCFC in Subcyclo mode, on a Supra-810 device, Patients were anaesthetised using Lidocaine, which was injected into the subtenon space with a blunt-tipped needle. The energy level varied from 1600 to 2000mW, most commonly 2000mW. It was applied for 80 seconds each, moving the tip along the superior and inferior limbus, along the meridian 180□ or 360□, avoiding positions at 3 and 9 o'clock in order not to damage the neurovascular structures of the ciliary body.

Antibacterial drops were instilled and aseptic dressing was applied.

Results and their discussion. Determination of visual acuity is one of the main methods of examination and gives valuable information about the eye condition. We evaluated the visual acuity in patients after MTCFC on the first day, in 3 and 6 months after the treatment.

In the group of patients examined by us the anti-vegf therapy (Lucencis) intravitreal and in the anterior chamber was performed simultaneously with MTCFC.

After the therapy, visual acuity was determined on the first day and 3 and 6 months after treatment. (Table 1).

Table 1

Dynamics of changes in visual acuity indices.

Visual acuity		**0**	**1/∞ pr.l.in certae**	**1/∞ pr.l.certae**	**The movement of the hand in front of the face**	**0,01**	**0,02**	**0,1**	**Total**
Before surgery									
	Number of patients	14	6	1	5	8	6	0	40
On day 1 after surgery									
	Number of	4	7	3	5	8	13	0	40

	patients								
3 months after surgery									
	Number of patients	0	8	5	6	5	16	0	40
6 months after surgery									
	Number of patients	0	7	6	4	6	17	0	40

Thus, it can be seen that on the first day after the therapy the visual acuity indices improved in all patients. On the group of patients examined by us after the first day of the procedure, the same index decreased by 25%, which shows an almost good result. The values of 1/∞ pr.l.in certae increased by 2.5% in the group of patients. The values of 1/∞ pr.l. certae increased by 5% respectively. The number of patients who determined arm movement in the faces did not change. The number of patients with a visual acuity of 0.01 also did not change. Patients with visual acuity 0.02 increased by 17.5%. The number of patients with visual acuity 0,1 did not change.

Thus, we can conclude that the change of visual acuity parameters in dynamics on the first day after the beginning of treatment was improving.

Determination of visual acuity of these patients in 3 months after the MTCFC and therapy revealed the improvement of this index. Thus, in comparison with the first day after the operation the number of patients with visual acuity ‘0’ decreased from 4 to complete absence of such patients, which was a 10% decrease. The number of patients with visual acuity 1/∞ pr.l.in certae increased by 2.5%. Patients with visual acuity scores of 1/∞ pr.l. in certae increased in number by 5%. certae increased in number by 5%. Hand movements at the face were detected 5% more at the third month after the start of treatment. Patients with visual acuity of 0.01 decreased by 7.5%. However, the decrease of this indicator was due to the fact that visual acuity of all these patients increased to 0.02. That is, the dynamics was positive. Thus, the patients with visual acuity of 0.02 made 16 people that corresponds to the increase by 7.5% in comparison with the first day after the treatment.

The last stage of visual acuity testing in patients of both groups was determination of this index on the sixth month after the beginning of therapy. As a result, it was revealed that the number of patients with visual acuity ‘0’ was not among our patients and this indicator did not change for three months after the last diagnosis. The number of patients with visual acuity 1/∞ pr.l.in certae was 2.5%. Exactly the same

rates were recorded in the increase of this index among patients with visual acuity 1/∞ pr.l. certae. Hand movement at the face in our patients fell by 5%, however, all patients in whom this index was recorded at the third month after treatment improved their visual acuity indices in dynamics, which suggests that the decrease in the percentage of this index is a positive dynamics. Visual acuity improvement up to 0.01 was observed in 2.5% of patients. During the follow-up period, the number of patients with visual acuity of 0.02 increased by 2.5%. Thus, we can conclude that the results of visual acuity at the sixth month after the start of treatment steadily improved

Thus, the number of patients with visual acuity '0' decreased by 26 in the first group and by 14 in the second group, which left 37.1% and 35%, respectively. However, it should be noted that in the second group by the sixth month of therapy there were no such patients. Absence of vision was recorded in 14 patients (35%), Presence of light was determined by 6 (15%) patients with neovascular glaucoma, correctly determined the direction of light 1 (2.5%), movement of the hand at the face was determined by 5 (12.5%) patients, 8 patients with visual acuity equal to 0.01, 20%, 6 patients had visual acuity equal to 0.02, which is equal to 15%. Improvement of visual acuity in the patients examined by us, in our opinion, is probably connected with apatosis of nerve cells of optic nerve, which was under high level of IOP leading to deterioration of optic nerve nutrition. After the procedure IOP decreased, optic nerve nutrition improved, which led to improvement of visual acuity, which corresponds to the data of the literature. IOP values fluctuated within 41,91□6,03. Intraocular pressure on maximal local hypotensive therapy These IOP values are significantly high and are one of the reasons for intolerable pain sensations in patients. On the first day after MTCFC operation IOP values decreased significantly in the patients examined by us. If before the operation IOP values were 41,91 □ 6,03, then on the second day after the manipulation it averaged 28,56 □ 1,77. The IOP decrease was statistically significant in comparison with the preoperative values (P<0,05). At 3 months postoperatively, IOP values also decreased in comparison with the first day values, on average it was 23.14 □ 0.89, which was statistically significant in comparison with the preoperative values (P<0.05). At 6 months after the operation IOP indices remained within the norm and made 23,62 □1,02. IOP decrease in our opinion is probably connected with the reduction of neovascularisation under the influence of angiogenesis inhibitors (Lucentis), as well as with the reduction of the thickness of the ciliary body tissue under the influence of MTSCFC and improvement of the uveoscleral outflow of the ocular fluid from the eye cavity. At biomicroscopic examination of the anterior segment of the eye in patients of both groups the anterior chamber of the investigated eye was of small size. Diffuse corneal oedema of I-II degree, congestive injection of the eyeball were also recorded. At gonioscopy the angle of the anterior chamber was closed. Pigment deposits and adhesions in the area of the anterior chamber angle. Increased lens thickness as confirmed by UBM. IOP elevation leads to compression of the nerve ending of the eye capsule. Which leads to severe pain in the eye area irradiating to the temple area, which irritates and excites the patient, there is insomnia, unpleasant feelings, which worsens the quality of life of patients. A vicious circle appears: IOP increase leads to increase in A/D, on

the other hand hypertension leads to psycho-emotional agitation, insomnia, leads to increased pain in the eye area.

On the first day after the operation all patients underwent biomicroscopic examination of the anterior segment of the eye. As a result of the study it was revealed that in all patients of both groups after MTCFC the anterior chamber, which was small before the operation, increased to normal volume. Corneal oedema of I-II degree, which was fixed in patients of both groups before the operation, also came to normal and in all patients it became possible to measure intraocular pressure by pneumotonometry method, which was impossible before the operation. In addition, the conjunctiva, which was characterised by the presence of congestive injection recorded in all patients before the operation, regained its normal physiological appearance.

This allows us to conclude that performing MTCFC and starting therapy in all patients leads to immediate disappearance of pathological symptoms in the anterior segment of the eye.

In the course of biomicroscopic examination performed 3 months after the operation, the preservation of physiological normal indicators of the anterior segment of the eye was revealed in dynamics under the therapy. The subjective sensations of the patients were assessed by evaluating the feeling of pain in the eye using the visual analogue scale (VAS) of pain. The scores of the level of subjective pain sensation before the therapy were almost the same. On the first day after ITCFC and anti-vegf therapy, the VAS scores were 0.5±0.60, which is statistically significant compared to the scores before therapy ($p<0.05$). The dynamics of pain feeling reduction continued to decrease three months after the MTCFC and against the background of the therapy. Thus, on the third month of therapy this index was 0,32±0,09. At the same time the obtained data are statistically reliable in comparison with the data before the therapy ($p<0,05$). On the sixth month of therapy the index of pain level decreased and was 0,89±0,61.

RESULTS: The use of anti-VEGF-therapy in combination with MTSFC in patients with neovascular glaucoma is an effective method of treatment, contributing to IOP reduction, increasing visual acuity, getting rid of eye pain and improving the quality of life of patients. Offering intravitreal injections of Lucensis AND MTSCFC resulted in IOP normalisation, reduction of corneal edema thickness, iris rubiosis and angle of the transmitted chamber according to UBM data, absence of IOP increase recurrences in distant terms after surgery.

Conclusions:

1. MTSCFC in combination with angiogenesis inhibitors - Lucentis, injected into vitreal and anterior chambers, did not cause complications from the side of eye structures, leading to disappearance of newly formed vessels in iris and UPC.

2. Continuation of intravitreal injections of Lucentis and MTSCFC resulted in normalisation of IOP in the distant postoperative period, increase of visual acuity, disappearance of pain in the eye, decrease of corneal edema;

3. the use of anti-VEGF-therapy in combination with MTSCFC in patients with neovascular glaucoma is

an effective method of treatment.

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