

Efficacy of Anti-VEGF Therapy for Myopic Choroidal Neovascularization: A 12-Month Prospective Study

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Abstract: Currently, there is an increase in complications of refractive errors, mainly myopia. One of the complications is myopic choroidal neovascularization (MCNV). The aim of the study is to improve the treatment of HCNV using anti-VEGF therapy according to the "treat-and-extend" scheme.

Materials and Methods. The study included 34 patients (34 eyes) with MCNV who received intravitreal injections of Brolucizumab. Best corrected visual acuity (BCVA), central retinal thickness (CST) and OCT parameters (subretinal fluid (SRF) height and choroidal neovascularization volume) dynamics were assessed using standard ophthalmological methods at 1, 3, 6, and 12 months. **Results.** The mean BCVA improved to 0.60 ± 0.07 after 12 months ($p < 0.05$), the mean CST decreased to $324,05 \pm 14,1 \mu\text{m}$ ($p < 0.05$) and the subretinal fluid (SRF) height decreased from $163.16 \pm 12.09 \mu\text{m}$ at baseline to $87.43 \pm 16.43 \mu\text{m}$ after 12 months ($p = 0.05$). Whereas in the control group, after 12 months, BCVA increased to 0.54 ± 0.06 , CST decreased to $320,12 \pm 12,4 \mu\text{m}$ and the SRF height decreased to $112.11 \pm 12.23 \mu\text{m}$ after 12 months. Furthermore, in the main group, the choroidal neovascularization volume decreased from $2.7 \pm 0,1 \text{ mm}^3$ to $1.3 \pm 0,06 \text{ mm}^3$ following a 12-month course of treatment. In the control group, this indicator decreased slightly to $1.4 \pm 0,07 \text{ mm}^3$ (compared to a baseline of $2.7 \pm 0,1 \text{ mm}^3$). **Conclusions.** Anti-VEGF therapy for MCNV demonstrates high efficacy, especially the "treat-and-extend" regimen minimizes the number of injections while ensuring a stable therapeutic effect.

Keywords: Myopic choroidal neovascularization, anti-VEGF therapy, Brolucizumab, treat-and-extend.

Introduction: Myopic choroidal neovascularization (mCNV) represents one of the most serious and vision-threatening complications associated with pathological myopia. This condition is characterized by the formation of abnormal blood vessels beneath the retina, which can lead to progressive and often irreversible loss of visual acuity if not addressed in a timely manner [3,5]. In the absence of appropriate and

early treatment, mCNV may result in permanent structural damage to the macular region, including the development of fibrotic or scar-like membranes, ultimately causing a marked decline in central visual function.

Epidemiological studies and clinical observations have shown that mCNV occurs in approximately 5–10% of individuals diagnosed with high or degenerative

myopia [1,3,8]. Pathological myopia, exceeding 6 diopters, occurs in 6-18% of the myopic population. It occurs in 0.5-2% of the population in the United States and Europe. Furthermore, it is the seventh leading cause of blindness worldwide. Pathological myopia is characterized by progressive elongation of the eyeball, as well as a number of degenerative changes in the sclera, choroid, Bruch's membrane, retinal pigment epithelium, and other retinal layers. Patients with myopia of 6 diopters or more, or a visual axis length of 25 mm or more, are at high risk of developing retinal damage. This elongation results in an eyeball volume increase of 50% compared to a normal eye. The list of changes in the fundus in the posterior pole that accompany pathological myopia includes peripapillary dystrophic changes, posterior staphyloma, superficial cracks or ruptures of the Bruch's membrane, subretinal hemorrhages, the appearance of areas of atrophy in the retinal pigment epithelium and choroid, and the appearance of choroidal neovascularization. Alarming, in about 90% of such cases, the condition leads to a deterioration in central vision, significantly impacting the patient's quality of life and ability to perform everyday tasks.

At present, the primary and most effective treatment strategy for managing mCNV involves the intravitreal administration of agents that inhibit vascular endothelial growth factor (VEGF). These anti-VEGF medications, such as ranibizumab and aflibercept, have become the cornerstone of therapy due to their proven ability to suppress abnormal blood vessel growth and reduce associated fluid leakage in the retina. Landmark clinical trials, including the MYRROR and RADIANCE studies, have provided robust evidence that anti-VEGF treatment not only halts disease progression but also leads to substantial improvement in visual acuity and helps preserve retinal structure and function over time [2,4,6,10].

Despite the encouraging outcomes associated with anti-VEGF therapy, questions remain regarding the most effective treatment regimen—specifically, how frequently injections should be administered and for how long. These issues are particularly important in the context of personalized medicine, where treatment plans are tailored to the individual needs and responses of patients. Moreover, minimizing the number of injections without compromising efficacy is a key goal, both to reduce the treatment burden on patients and healthcare systems and to lower the risk of injection-related complications.

Purpose of the research. To improve the treatment of myopic choroidal neovascularization (mCNV) through the use of anti-VEGF therapy following the “treat-and-extend” protocol.

METHODS

The study was conducted at the “VISART” ophthalmology clinic in Tashkent.

A total of 34 patients (34 eyes) with mCNV were included. The patients' ages ranged from 18 to 65 years (mean age — 38.7 ± 9.4 years). The male-to-female ratio was 1:1.3.

Inclusion criteria for the study were: diagnosed mCNV based on clinical presentation and instrumental examination data; no prior anti-VEGF treatment; best-corrected visual acuity (BCVA) ranging from 0.1 to 0.5; and absence of other retinal or choroidal diseases affecting vision.

The study was prospective, open-label, and uncontrolled. The observation period was 12 months.

Depending on the treatment regimen, patients were divided into two homogeneous groups: Control group, 17 patients (17 eyes) received intravitreal injections of an anti-VEGF drug (Brolucizumab) following a fixed regimen of three injections at monthly intervals. Main group, 17 patients (17 eyes) received intravitreal Brolucizumab injections following the "treat-and-extend" protocol — the interval between injections was gradually extended depending on the clinical picture.

Patients underwent comprehensive ophthalmological examinations at baseline and at 1, 3, 6, and 12 months. All patients received the following diagnostic evaluations: best-corrected visual acuity (BCVA), optical coherence tomography (OCT) and OCT-angiography to assess retinal and choroidal morphology, fluorescein angiography (as needed) to confirm the presence of mCNV, tonometry, biomicroscopy, and ophthalmoscopy to evaluate the anterior and posterior segments of the eye.

Statistical analysis was performed using descriptive statistics, paired Student's t-test, and analysis of variance (ANOVA) to compare dynamic changes in parameters.

RESULTS

The findings of this study revealed a marked and clinically meaningful improvement in visual function, alongside a reduction in the pathological activity of myopic choroidal neovascularization (mCNV), as assessed through optical coherence tomography (OCT). The progression of mean best-corrected visual acuity (BCVA), central retinal thickness (CRT) and OCT parameters (the height of subretinal fluid (SRF) and choroidal neovascularization volume) throughout the study period is detailed in Table 1 and Table 2, illustrating the treatment response over time.

Table 1.

Dynamics of BCVA and Central Retinal Thickness (M±SD)

Observation Periods	BCVA		CRT, μm	
	Control	Main	Main	Control
Initial	0,34±0,09	0,34±0,1	163,16 ± 12,09	166,27 ± 16,09
1 months	0,49±0,1	0,48±0,11	159,32± 16,12	148,41± 12,05
3 months	0,55±0,09*	0,53±0,09*	124,12± 15,25*	134,06± 13,72*
6 months	0,57±0,08*	0,56±0,06*	128,34±12,11*	130,01±8,09*
12 months	0,54±0,06*	0,60±0,07*	87,43 ± 16,43*,**	112,11 ± 12,23*,**

Note: * — values are statistically significant compared to baseline,

** — values are statistically significant compared to the 1-month follow-up ($p < 0.05$)

Following six months of therapy, both the control group and the main (intervention) group demonstrated a statistically significant enhancement in visual acuity. Specifically, the BCVA improved from a baseline value of 0.34 ± 0.09 to 0.57 ± 0.08 in the control group, and to 0.56 ± 0.06 in the main group. These findings indicate that both treatment strategies were effective in restoring visual function during the early phase of management.

However, a divergence in outcomes was observed as the study progressed. By the 12th month of follow-up, the control group exhibited a slight decline in visual acuity, with BCVA decreasing to 0.54 ± 0.06 . In contrast, the main group continued to show visual gains, reaching a BCVA of 0.60 ± 0.07 . The difference between the two groups at this time point was statistically significant ($p < 0.05$), underscoring the sustained benefit of the treatment regimen implemented in the main group.

In addition to functional outcomes, anatomical changes

in the retina were also monitored through measurements of central retinal thickness (CRT). In the main group, a substantial and statistically significant reduction in CRT was observed as early as one month after initiating treatment. These improvements in retinal morphology remained stable through the sixth month, suggesting an early and lasting therapeutic effect.

By the end of the 12-month period, the average CRT in the main group had decreased to $320.12 \pm 12.4 \mu\text{m}$, reflecting a continued anatomical response. Meanwhile, in the control group, only a modest reduction in CRT was noted, with values decreasing to $324.05 \pm 14.1 \mu\text{m}$ compared to the six-month data, a change that was statistically less pronounced ($p < 0.05$). These results suggest a more robust structural response in the main group and support the need for individualized treatment adjustments in the control group to achieve optimal outcomes.

Table 2.

Dynamics of height of SRF and Choroidal Neovascularization Volume (M±SD)

Observation Periods	Height (SRF), μm		Choroidal neovascularization volume, mm^3	
	Main	Control	Main	Control
initial	163,16 ± 12,09	166,27 ± 16,09	2,7±0,1	2,7±0,1
1 months	159,32± 16,12	148,41± 12,05	2,5±0,07*	2,4±0,05*
3 months	124,12± 15,25*	134,06± 13,72*	2,0±0,04*	2,2±0,08*
6 months	128,34±12,11*	130,01±8,09*	1,6±0,08***	1,5±0,09***
12 months	87,43 ± 16,43***	112,11 ± 12,23***	1,3±0,06***	1,4±0,07***

Note: * — values are statistically significant compared to baseline,

** — values are statistically significant compared to the 1-month follow-up ($p < 0.05$)

According to OCT parameter analysis, in the main treatment group, the height of subretinal fluid (SRF) significantly decreased from a baseline of $163.16 \pm 12.09 \mu\text{m}$ to $124.12 \pm 15.25 \mu\text{m}$ after three months. Although there was a slight increase to $128.34 \pm 12.11 \mu\text{m}$ at six months, the most substantial reduction was observed by 12 months, reaching $87.43 \pm 16.43 \mu\text{m}$ ($p < 0.05$).

For the control group, SRF height showed a notable decrease during the first and third months of observation, measuring $148.41 \pm 12.05 \mu\text{m}$ and $134.06 \pm 13.72 \mu\text{m}$, respectively. This decline continued slightly in subsequent months, with the SRF height reaching $112.11 \pm 12.23 \mu\text{m}$ by the 12-month mark.

OCT measurements of choroidal neovascularization (CNV) volume indicated a decreasing trend in both groups, with only minor differences between them. Both groups started with a baseline CNV volume of $2.7 \pm 0.1 \text{mm}^3$. The largest difference between the groups was seen at three months, where the main group's average CNV volume was $2.0 \pm 0.04 \text{mm}^3$ compared to the control group's $2.2 \pm 0.08 \text{mm}^3$. By 12 months post-treatment, the main group's CNV volume had dropped to $1.3 \pm 0.06 \text{mm}^3$, while the control group's was $1.4 \pm 0.07 \text{mm}^3$.

These findings collectively affirm the high therapeutic efficacy of anti-VEGF treatment in patients with mCNV, particularly when administered according to the "treat-and-extend" regimen. The most pronounced functional and morphological improvements were observed within the first 3 to 6 months of therapy, highlighting the importance of early and proactive treatment. By the 12-month mark, the main group continued to experience improvements in BCVA, while the control group showed a slight decline, suggesting that sustained benefits may depend on the treatment protocol used. Similarly, the significant reduction in CRT observed in the main group, as opposed to the relatively minor change in the control group, reinforces the necessity for a personalized and possibly more intensive treatment approach in some cases to maintain long-term disease control and visual function. The average subretinal fluid (SRF) and choroidal neovascularization volume significantly decreased by the 12-month follow-up. In the control group, only a slight reduction in this parameter was noted, indicating the need for a repeat course of treatment.

DISCUSSION

The results obtained in our study align closely with the outcomes reported in large-scale, well-established clinical trials such as MYRROR [9] and RADIANCE [7]. These pivotal studies have demonstrated a comparable degree of improvement in best-corrected visual acuity

(BCVA), with patients showing an average gain of approximately 0.2 to 0.3 units over a 12-month treatment period. This consistency across different research settings strengthens the evidence base supporting the effectiveness of anti-VEGF therapy in the management of myopic choroidal neovascularization (mCNV).

Taken together, our findings reinforce the conclusion that intravitreal injection of anti-vascular endothelial growth factor (anti-VEGF) agents is a highly effective therapeutic approach for patients with mCNV. When administered using a treat-and-extend regimen—where treatment intervals are gradually lengthened based on the patient's individual response—this approach enables not only sustained and clinically meaningful improvements in visual acuity, but also promotes long-term regression of neovascular activity. The use of this proactive, personalized dosing strategy helps to optimize treatment outcomes while potentially reducing the burden of frequent injections on patients and healthcare systems.

CONCLUSION

Anti-VEGF therapy administered for the treatment of myopic choroidal neovascularization under a "treat-and-extend" regimen demonstrated a high level of therapeutic efficacy over a 12-month observation period. This individualized treatment approach resulted in a statistically significant improvement in best-corrected visual acuity ($p < 0.05$), reflecting substantial functional recovery in affected patients. In parallel, a significant reduction in central retinal thickness was also observed ($p < 0.05$), indicating favorable anatomical remodeling of the retina in response to therapy, as well as the regression of morphological changes, such as a reduction in subretinal fluid height and choroidal neovascularization volume ($p < 0.05$), over a 12-month period.

This finding suggests not only effective suppression of neovascular processes but also the potential for long-term stabilization of retinal morphology when anti-VEGF agents are applied in a proactive, response-guided dosing protocol. Collectively, these results underscore the clinical value of the treat-and-extend strategy in optimizing both visual and anatomical outcomes while potentially reducing the overall treatment burden for patients with mCNV.

REFERENCES

1. Fayzrakhmanov R.R. Anti-VEGF therapy of neovascular age-related macular degeneration: from randomized trials to routine clinical practice. Russian Ophthalmological Journal. 2019;12(2):97-105. (in Russ.) <https://doi.org/10.21516/2072->

[0076-2019-12-2-97-105](https://doi.org/10.32364/2311-7729-2019-19-2-99-104)

2. Markosian G.A., Tarutta E.P., Tarasova N.A., Maximova M.V. The fundus changes in pathological myopia. Russian Journal of Clinical Ophthalmology. 2019;19(2):99-104. (in Russ.) <https://doi.org/10.32364/2311-7729-2019-19-2-99-104>
3. Makogon S.I., Kuznetsova E.N. Myopic Choroidal Neovascularization: Questions Regarding Patient Management Remain. Acta biomedica scientifica. 2021; 6(6-1): 74-81. (in Russ.) <https://doi.org/10.29413/ABS.2021-6.6-1.9>
4. Kurysheva N.I., Sergushev S.G., Naumova V.I., Ivanova A.A. Evolution of the use of angiogenesis inhibitors in ophthalmology. Effective Pharmacotherapy. 2022; 18 (11): 58–67. (in Russ.) <https://doi.org/10.33978/2307-3586-2022-18-11-58-67>
5. Korotkikh S.A., Bobykin E.V., Nazarova N.S., Melekhina E.E. Long-term outcomes of anti-angiogenic therapy for macular neovascular disorders. Russian Annals of Ophthalmology. 2016;132(1):76-84.(in Russ.) <https://doi.org/10.17116/oftalma2016132176-84>
6. Zenkova E.S., Myagkov A.V., Ignatova N.V., Zhabina O.A. Medical technology for the management of myopia progression. The EYE GLAZ. 2024;26(1):49-55. (in Russ.) <https://doi.org/10.33791/2222-4408-2024-1-49-55>
7. Wong T.Y, Ohno-Matsui C, Lanzetta M. Myopic choroidal neovascularization: Current concepts and update on anti-VEGF therapy. British Journal of Ophthalmology.2015;99(3):289–296. <https://doi.org/10.1136/bjophthalmol-2014-305131>
8. Wolf S, Balciuniene M, Laganovska J. RADIANCE: A study of ranibizumab for myopic choroidal neovascularization. Ophthalmology. 2014;121, (3) : 682–692. <https://doi.org/10.1016/j.ophtha.2013.10.023>.
9. Ikuno Y, Ohno-Matsui K, Wong TY, Korobelnik J.F, Vitti R, Li T, Stemper B, Asmus F, Zeitz O, Ishibashi T. MYRROR Investigators. Intravitreal Aflibercept Injection in Patients with Myopic Choroidal Neovascularization: The MYRROR Study. Ophthalmology. 2015 Jun;122(6):1220-7. <https://doi.org/10.1016/j.ophtha.2015.01.025>
10. El Matri L, Chebil A, Kort F. Current and emerging treatment options for myopic choroidal neovascularization. Clin Ophthalmol. 2015;9:733-744. <https://doi.org/10.2147/OPHT.S49437>