https://doi.org/10.17116/oftalma201913505146

Long-term results of spectacle correction with perifocal defocus in children with progressive myopia

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SUMMARY

Peripheral defocus plays a significant role in the formation of refraction. Perifocal glasses make it possible to differentially correct the central and peripheral refraction of the eye along the horizontal meridian and correct or reduce peripheral hyperopia.

Purpose of the study - to study the long-term results of the influence of wearing perifocal glasses on the dynamics of refraction in children with progressive myopia.

Material and methods. Perifocal glasses were prescribed for children 7-14 years old with progressive myopia from (-) 1.0 to (-) 6.0 diopters in terms of the refractive index. Children were examined before glasses were prescribed and after 6 months, 12-18 months, 2 years, 3 years, and 4 years-5 years. Visometry, determination of the nature of vision, autorefractometry before and after cycloplegia, biomicroscopy, ophthalmoscopy, and biometrics were performed. Peripheral refraction was examined at 15 ° and 30 ° points in the nasal (N15 and N30) and temporal (T15 and T30) meridians without correction and in perifocal glasses.

Results. In perifocal glasses in the area 15 °, myopic defocus was formed in 100% of the eyes, which averaged (-) 0.05 ± 0.1 diopters at T15 °, (-) 0.25 ± 0.16 diopters at N15 ° and (-) 0 , 44 ± 0.03 diopters at T30 °. In the N30 ° zone, the hyperopic defocus decreased by 4 times and amounted to 0.38 ± 0.03 diopters. The rate of progression of myopia decreased from 0.8 diopters (baseline value) to 0.17 diopters at 4-5 years of follow-up. After 6 months of wearing perifocal glasses, the increase in refraction was (-) 0.2 ± 0.02 diopters (in control (-) 0.38 ± 0.04 diopters), after 12-18 months - (-) 0.38 ± 0 , 04 diopters (in control (-) 0.63 ± 0.09 diopters), after 2 years - (-) 0.78 ± 0.06 diopters (in control (-) 1.18 ± 0.15 diopters), after 3 years - (-) 0.99 ± 0.12 diopters (in control (-) 1.65 ± 0.20 diopters). Over 4 to 5 years of follow-up, the increase in refraction in patients of the main group was (-) 1.16 ± 0.2 diopters, which is 60% less than in patients of the control group - (-) 1.95 ± 0.2 diopters.

Conclusion. The constant wearing of perifocal glasses reduces the rate of progression of myopia in children in 4.5 times compared with the initial and 1.6 times (60%) compared with the indicators in children of the control group. Perifocal glasses can be recommended as an optical aid to slow the progression of myopia.

Keywords: *refraction, myopia, progressive myopia, peripheral refraction, myopic defocus, correction of myopia.*

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Longterm results of perifocal defocus spectacle lens correction in children with progressive myopia

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ABSTRACT

Peripheral defocus plays a significant role in the formation of refraction. Perifocal spectacles allow differentiating correction of central and peripheral refraction of the eye along the horizontal meridian and can correct or reduce peripheral hyperopia.

Purpose - to study the long-term results of wearing perifocal spectacles on the refraction in children with progressive myopia.

Material and methods. Perifocal spectacles were assigned to children of 7-14 years old with progressive myopia from –1.0 to - 6.0 D in terms of refractive spherical equivalent. The children were examined before the prescription of perifocal spectacles and after 6 months, 12-18 months, 2 years, 3 years and 4-5 years. We measured visual acuity, the character of vision, refractive error before and after cycloplegia, performed biomicroscopy, ophthalmoscopy and biometry. Peripheral refraction was studied at

15 ° and 30 ° points in the nasal (N15 and N30) and temporal (T15 and T30) meridians without correction and while wearing perifocal spectacles.
Results. In perifocal spectacles, in the 15 ° zone, 100% of the eyes formed myopic defocus, which averaged –0.05 ± 0.1 D in T15 °, - 0.25 ± 0.16 D in N15 ° and –0.44 ± 0.03 D in T30 °. In the N30 ° zone, the hypermetropic defocus decreased by 4 times and to 0.38 ± 0.03 D. The rate of progression of myopia decreased from 0.8 D of baseline values to 0.17 D at 4-5 years of follow-up. After 6 months of wearing perifocal spectacles, the refraction gain was –0.2 ± 0.02 D (in the control group it was –0.38 ± 0.04 D), after 12-18 months - (-) 0.38 ± 0.04 D (–0.63 ± 0.09 D in the control group), after 2 years - (-) 0.78 ± 0.06 D (–1.18 ± 0.15 D in the control group), after 3 years - (-) 0.99 ± 0.12 D (–1.65 ± 0.20D in the control group). During the 4-5 years of the follow-up, the refractive error in the main group was – 1.16 ± 0.2 D, which is 60% less than in the control group (–1.95 ± 0.2 D).
Conclusion. Constant wearing of perifocal spectacles reduces the rate of myopia progression in children by 4.5 times compared with the initial rate, and by 1.6 times (by 60%) in comparison with the control group. Perifocal spectacles are recommended as optical means to slow the progression of myopia.

Keywords: *refraction, myopia, progressive myopia, myopia control, peripheral refraction, myopic defocus, myopia correction.*

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The influence of different methods of correction and its completeness on the development and progression of myopia continues to occupy the minds of eye researchers [1-3]. In light of the hypothesis of the effect of induced peripheral defocus on refractogenesis [4], attempts are increasingly being made to control eye growth using optical means that induce myopic peripheral defocus in the eye. The experiment has shown that the induced peripheral hyperopic defocus stimulates the growth of the eye and the formation of axial myopia, while myopic, on the contrary, has an inhibitory effect on refractogenesis [5, 6]. The results of clinical studies also indicate the role of peripheral hyperopic defocus in stimulating eye lengthening [7, 8]. The stabilizing effect of orthokeratological lenses on refractogenesis is explained by the formation of a peripheral myopic defocus [9-13]. Attempts are being made to create glasses and contact lenses capable of forming relative peripheral myopia in the eye. In 2002, a description of potential spectacle lens designs for the correction of off-center refraction in emmetropia, myopia, and hyperopia, which, however, had significant aberrations, was presented [14]. Later, RRG lenses were designed to maintain high central vision and increase positive power in all radial directions. The enhancement of the sphere-equivalent refraction in RRG lenses from the center to the periphery was about 1.0 diopters per 10 ° compared to uncorrected peripheral refraction [15]. In Russia, the lens, fraction from the center to the periphery from the nasal side by 2.0 diopters, from the temporal side by 2.5 diopters. The results of a study carried out at the Moscow Research Institute of State Security Helmholtz, showed that the Perifocal-M lens corrects peripheral hyperopia at 15 °, forms myopia at 15 ° to the nose and to the temple from fovea and at 30 ° of the temporal periphery, at 30 ° of the nasal periphery, 5 times reduces peripheral hyperopia [16, 17].

Various designs of soft contact lenses have been proposed for the formation of peripheral myopic defocus - bi- and multifocal [18-20]. The first data on the effect of spectacle and contact lenses inducing peripheral myopic defocus on the progression of myopia and eye growth are ambiguous. Our Chinese colleagues have not received convincing data on the stabilizing effect of glasses designed to reduce peripheral hyperopia during 6-12 months of use. The stabilizing effect was observed only in children 6-12 years old with a burdened family history (which seems to us to be very significant!). The decrease in the progression of myopia in this group compared to the control (monofocal glasses) was 0.29 diopters during the indicated follow-up period (less than 1 year) [21]. In studies of the effect of progressive glasses on the progression of myopia, it is noted that such glasses are able to reduce hyperopic defocus at least in the upper half of the visual field, which provides their stabilizing effect. The results of a randomized study evaluating the effect of progressive glasses showed the ability of such glasses to reduce peripheral hyperopia and slow the progression of myopia. Shift of the sphere-equivalent refractive band within 1 year in children who wore The results of a randomized study evaluating the effect of progressive glasses showed the ability of such glasses to reduce peripheral hyperopia and slow the progression of myopia. Shift of the sphere-equivalent refractive band within 1 year in children who wore The results of a randomized study evaluating the effect of progressive glasses showed the ability of such glasses to reduce peripheral hyperopia and slow the progression of myopia. Shift of the sphere-equivalent refractive band within 1 year in children who wore

glasses inducing myopic defocus in the upper half of the visual field amounted to (-) 0.38 diopters, in those who wore glasses inducing a similar hypermetropic defocus - (-) 0.65 diopters [22]. A more significant decrease in the progression of myopia was obtained in children using special bifocal contact lenses. During 1 year of follow-up, the difference compared to the control was 0.57 diopters [18]. Our earlier studies of the stabilizing effect of Perifocal-M glasses on the progression of myopia showed that the proposed design of glasses inducing myopic defocus gives convincing results in stabilizing myopia as compared with the control group in terms of up to 18 months [17]. Continuing observation of children using perifocal glasses to correct progressive myopia will make it possible to assess their effect on refractogenesis within 5 years.

The aim of the study was to study the long-term results of the effect of wearing perifocal glasses on the dynamics of refraction in children with progressive myopia.

Material and methods

The study was carried out at the Federal State Budgetary Institution "Scientific Medical Research Center for Eye Diseases named after V.I. Helmholtz "of the Ministry of Health of Russia in the period from 2012 to 2018, 94 children of the main group were monitored. Perifocal glasses were prescribed to children aged 7-14 years with progressive myopia from (-) 1.0 to (-) 6.0 diopters in terms of the refractive index, with the best corrected visual acuity of 0.8 and above, binocular characteristics. rum of sight. The average age at the beginning of wearing glasses was 10.5 ± 0.14 years. Perifocal glasses have always been prescribed for permanent wear. The correction was carried out close to complete, not more than 0.5 diopters weaker than cycloplegic refraction. Children were examined before glasses were prescribed, after 6 months, 12-18 months, 2 years, 3 years, and 4-5 years from the start of wearing glasses. The maximum observation period is 5 years.

The dynamics of refraction was assessed in children wearing perifocal glasses: after 6 months - in 94 children (188 eyes), after 12-18 months - in 72 children (142 eyes), after 2 years - in 58 children (116 eyes), after 3 years - in 42 children (84 eyes), after 4-5 years - in 28 children (56 eyes).

The control group consisted of 52 children with progressive myopia at the age of 8-14 years. All children in the control group were assigned monofocal glasses for permanent wearing with close to full correction. The average age at the time of inclusion in the control group was 10.5 ± 0.15 years.

The dynamics of refraction in children of the main and control groups was assessed in comparison with the indicators at the beginning of the observation. Refraction was considered to be stable if its value increased by no more than 0.5 diopters over the entire observation period (dynamics from 0 to 0.5 diopters over 5 years).

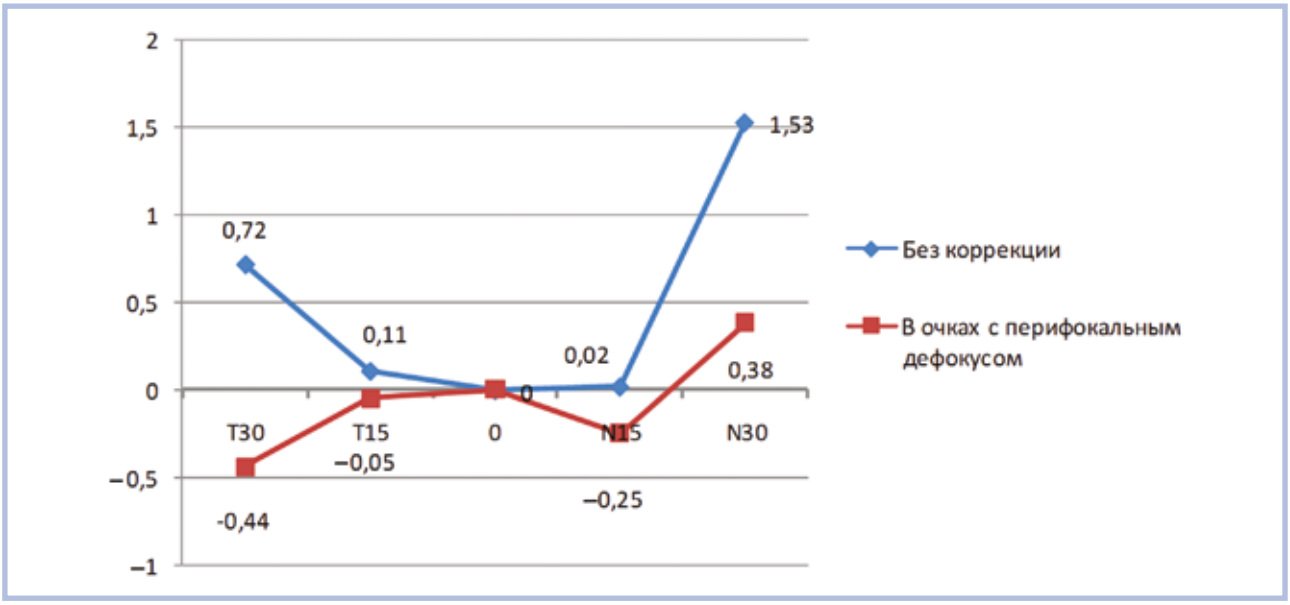
The examination of children was carried out before the appointment of glasses and in each of the designated periods. The examination included visometry without correction and with optimal correction, determination of the nature of vision, refractometry before and after cycloplegia (1% cyclopentolate 2 times), biomicroscopy, ophthalmoscopy, determination of relative accommodation reserves, study of muscle balance (phorias), objective study of peripheral refraction at 15 ° and 30 ° points in the nasal (N15 and N30) and temporal (T15 and T30) meridians without correction and in perifocal glasses using an automatic "open field" refkeratometer WR-5100K (Grand Seiko Co. Ltd., Japan), the length of the anteroposterior axis (PZO) of the eye was measured by biometrics using partially coherent interferometry on an IolMaster apparatus (Carl Zeiss, Germany).

The study in perifocal glasses was carried out with a turn of the head in the direct direction of the gaze in order to preserve the situation of peripheral defocus induced by the glasses when looking into the distance.

Results and discussion

Effect of glasses with perifocal defocus on peripheral refraction of the eye

The results of the study of peripheral refraction for glasses with perifocal defocus, obtained using an automatic "open field" refkeratometer WR-5100K without correction and in Perifocal-M glasses, showed that without correction, hyperopic defocus occurs in 61.5% of eyes at T15 ° and T30 °; in 46% of the eyes at N15 °; in 100% of the eyes at N30 °. The magnitude of hyperopic defocus without correction averaged + 0.11 ± 0.11 diopters at T15 °; + 0.72 ± 0.28 diopters at T30 °; + 0.02 ± 0.1 diopters at N15 °; + 1.53 ± 0.2 diopters at N30 °. Myopic defocus was formed in the Perifocal-M glasses in the 15 ° zone in 100% of the eyes, which averaged (-) 0.05 ± 0.1 diopters at T15 °, (-) 0.25 ± 0.16 diopters at N15 ° and (-) 0.44 ± 0.03 diopters at T30 °. In the N30 ° zone, the hyperopic defocus decreased by 4 times and amounted to 0.38 ± 0.03 diopters**(rice. 1)**... Thus, glasses with special design lenses with horizontal progression Perifocal-M form a relative peripheral myopic defocus in the eye or significantly reduce peripheral hyperopic defocus.

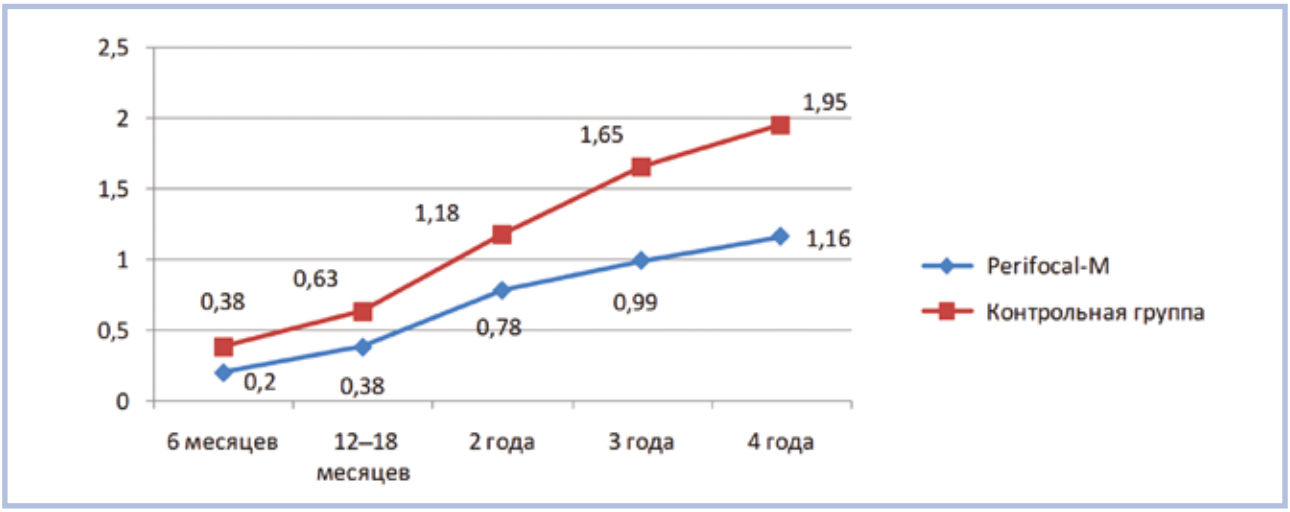


***Rice. 1.*The magnitude of the relative peripheral defocus without correction and in perifocal glasses.**

The abscissa shows the measurement area of the relative peripheral defocus: T30 and T15 lie at 30 ° and 15 ° horizontally from the center from the temporal side, N15 and N30 - 15 ° and 30 ° horizontally from the nasal side.

***Fig. 1.*Amount of peripheral defocus without correction and in perifocal spectacles.**

Horizontal axis - area of measurement of relative peripheral defocus: T30 and T15 lie in 30₀ and 15₀ across from center in the temporal side, N15 and N30 - in 15₀ and 30₀ across the nasal side; vertical axis - amount of relative peripheral defocus, Dioptres.



***Rice. 2.*Strengthening of refraction in children of the main and control groups at different periods of observation.**

***Fig. 2.*Increase of refraction in children of the main and control groups at various follow-up points.**

Influence of glasses with perifocal defocus on the dynamics of refraction of the eye and the magnitude of the PZO

After 6 months of wearing perifocal glasses in patients of the main group, cycloplegic objective refraction changed by +0.5 diopters (attenuation!) - (-) 1.25 diopters. The average change in objective cycloplegic refraction was (-) 0.2 ± 0.01 diopters**(rice. 2)**... In the first six months of follow-up, weakening of cycloplegic refraction was revealed in 39.4% (74 eyes) of cases; stabilization of cycloplegic refraction was observed in 36.7% (69 eyes) of cases. An increase in refraction was noted only in 23.9% (45 eyes) of observation cases **(tab. 1)**... The refraction in children of this group increased by 0.63 diopters and more in terms of the sphere equivalent. Only 1 (1.1%) child had a bilateral increase in cycloplegic refraction by (-) 1.25 diopters. During the first 6 months of observation, the annual gradient of progression (GGP) in perifocal glasses decreased 2 times compared with the initial values (0.4 and 0.8 diopters, respectively, $p<0.05$) **(tab. 2)**... PZO length

***Table 1*... Stabilization of refraction at different periods of observation in children of the main group who wore glasses with perifocal defocus**

***Table 1.* Stabilization of refraction at various follow-up points in children wearing perifocal spectacles**

The dynamics of the objective cycloplegic refraction	Observation period		
	6 months (188 eyes)	12-18 months (144 eyes) 2 years (116 eyes) 3 years (84 eyes)	4-5 years (56 eyes)
Attenuation,%	39.4	9.7 2.6 2.4	3.6
Stabilization,%	36.7	52.8 47.4 46.4	37.5
Gain,%	23.9	37.5 50.0 51.2	58.9

***table 2*... Gradient of myopia progression at different times of wearing glasses with perifocal defocus**

***Table 2.* Gradient of myopia progression at various follow-up points when wearing perifocal spectacles**

Gradient progression myopia, diopters	Observation period					
	Before appointment	6 months	12-18 months 2 years		3 years	4-5 years
Group						
the main	0.8 ± 0.06	0.4 ± 0.06	0.33 ± 0.05	0.30 ± 0.05	0.21 ± 0.03	0.17 ± 0.02
control	0.8 ± 0.05	0.8 ± 0.05	0.53 ± 0.08	0.62 ± 0.08	0.47 ± 0.08	0.3 ± 0.06

after 6 months of using perifocal glasses increased by an average of 0.05 ± 0.02 mm.

In children of the control group, after 6 months, the average change in cycloplegic refraction was (-) 0.38 ± 0.04 diopters **(see fig. 2)**... Refraction remained stable in only 40.4% (42 eyes) of cases. In other cases, the refraction increased by (-) 0.63-1.12 diopters in the sphere equivalent. GHP in children of the control group was 0.8 ± 0.05 diopters. The increase in the length of the PZO in children of the control group was 2 times greater than that of the main group, and amounted to 0.11 ± 0.03 mm (p<0.05).

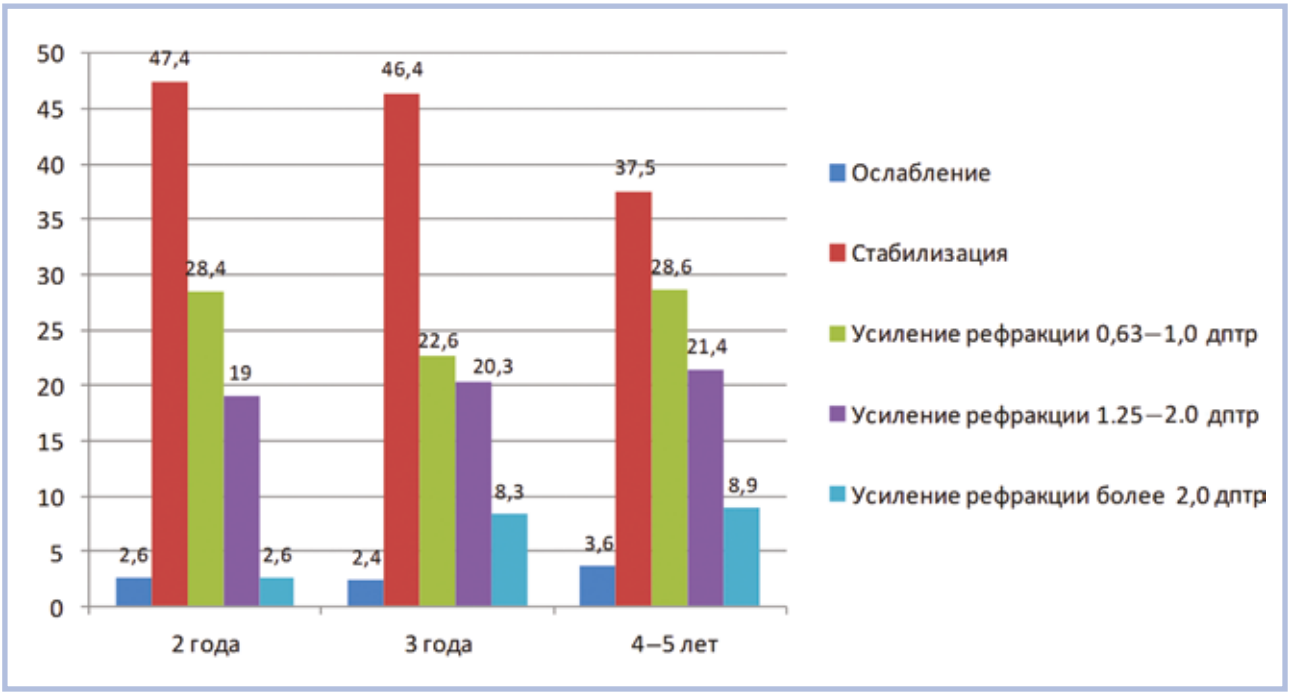
After 12-18 months of wearing perifocal glasses, cycloplegic objective refraction increased on average by (-) 0.38 ± 0.04 diopters **(see fig. 2)**... In 9.7% (14 eyes) of cases, a weakening of the refraction was observed in comparison with its starting values. Stabilization of cycloplegic refraction was observed in 52.8% (76 eyes) of cases. In 37.5% of cases, the refraction increased by 0.63-1.63 diopters in the sphere equivalent. During 12-18 months of observation, HGP in glasses with perifocal defocus was 0.33 ± 0.05 **(see table 2)**... The length of the PZO after 12-18 months of wearing perifocal glasses increased on average by 0.11 ± 0.02 mm compared to the starting values, i. E. only by this time the PZO indices approached the values in children of the control group, assessed after 6 months of observation.

In children of the control group, an increase in refraction was detected in 73.1% and during this period averaged (-) 0.63 ± 0.09 diopters **(see fig. 2)**... The increase in the length of the PZO was almost 2 times greater than this indicator in the children of the main group, and after 12-18 months of observation, its values were 0.20 ± 0.03 mm. The value of HGP in the control group during this period was 0.53 ± 0.08 diopters. The difference between the indicators in children of the main and control groups is statistically significant (p<0.05).

After 2 years of wearing perifocal glasses, the cycloplegic objective refraction increased on average by (-) 0.78 ± 0.06 diopters as compared with the starting values. In 2.6% (3 eyes) of cases, a weakening of refraction was observed in comparison with its starting values. Stabilization of cycloplegic refraction was observed in 47.4% (55 eyes) of cases, in 50.0% (58 eyes) of cases, cycloplegic refraction increased in comparison with the values at the beginning of observation. In children of this group, the refraction increased by 0.63-2.25 diopters in the sphere equivalent: in
In 28.4% (33 eyes) of cases, the increase was insignificant, by 0.63-1.0 diopters, in 19.0% (22 eyes) - by 1.25-2.0 diopters, progression of more than 2.0 diopters was observed only in 2.6% (3 eyes) of cases **(rice. 3)**... On the 2nd year of follow-up, the gradient of progression in Perifocal-M glasses was more than 2 times lower than the initial one and amounted to 0.3 ± 0.05 diopters.**(see table. 2)**... The PZO value after 2 years of using Perifocal-M glasses increased by an average of 0.22 ± 0.03 mm in comparison with the starting values.

In children of the control group, an increase in refraction was detected in 92.3% and during this period averaged (-) 1.18 ± 0.15 diopters **(see fig. 2)**... The increase in PZO was 0.50 ± 0.06 mm. The difference between the indicators in children of the main and control groups is statistically significant (p<0.05). The magnitude of the progression gradient for the 2nd year of observation in children of the control group was 0.62 ± 0.08 diopters, which is 2 times higher than in children of the main group.

(see table. 2)... After 3 years of wearing perifocal glasses, the cycloplegic objective refraction increased on average by (-) 0.99 ± 0.12 diopters compared with the starting values**(see fig. 2)**... Stabilization of cycloplegic refraction was observed in 46.4% (39 eyes) of cases, in 2.4% (2 eyes) of cases, weakening of cycloplegic refraction was noted, in 51.2% of cases, cycloplegic refraction was increased in 3 years.



***Rice. 3.*Changes in cycloplegic refraction in children who wore perifocal glasses, in the long-term follow-up with the original values.**

***Fig. 3.*Changes in cycloplegic refraction in children wearing perifocal spectacles in the long-term follow-up, compared to initial values.**

poured 0.63-2.88 diopters in the sphere equivalent **(see table 1)**: in 22.6% (19 eyes) cases by 0.63-1.0 diopters, in 20.3% (17 eyes) cases by 1.12-2.0 diopters, more than 2.0 diopters in 8 , 3% of cases **(see fig. 3)**... On the 3rd year of observation, the gradient of progression in glasses with perifocal defocus was 0.21 ± 0.03 diopters**(cm. tab. 2)**... The value of PZO after 3 years of using perifocal glasses increased on average by 0.36 ± 0.04 mm compared to the values at the beginning of the observation.

In children of the control group, no cases of stabilization of refraction were observed for 3 years. Objective refraction after 3 years increased on average by (-) 1.65 ± 0.2 diopters**(see fig. 2)**... The average gradient of progression in the 3rd year of follow-up was 0.47 ± 0.08 diopters. The length of the PZO increased by 0.58 ± 0.08 mm; the difference in the values of refraction enhancement, HGP and PZO length in the main and control groups is statistically significant (p<0.05).

After 4-5 years of continuous wearing of peripheral glasses, cycloplegic objective refraction increased on average by (-) 1.16 ± 0.13 diopters in comparison with the starting values **(see fig. 2)**... Stabilization of refraction in comparison with the starting values was observed in 37.5% (21 eyes) of cases, weakening - in 3.6% (2 eyes). In other cases, for 4-5 years the refraction increased by 0.63-3.0 diopters in sphere equivalent **(see table. 1)**: in 28.6% (16 eyes) cases slightly - by 0.63-1.0 diopters, in 21.4% (12 eyes) cases by 1.12-2.0 diopters, more than by 2.0 diopters in 8.9% (5 eyes) of cases **(see fig. 3)**... There were no cases of increased refraction by more than (-) 3.0 diopters in comparison with the initial values. In the last year of follow-up, the gradient of progression in Perifocal-M glasses was 0.17 ± 0.02 diopters **(see table 2)**, at the same time, during the entire observation period of 4-5 years, the GGP was 0.26 diopters / year. In patients of the main group, the PZO value after 4-5 years of using perifocal glasses increased by an average of 0.46 ± 0.05 mm in comparison with the starting values.

In children of the control group, objective cycloplegic refraction after 4-5 years increased on average by (-) 1.95 ± 0.26 diopters, the gradient of progression in the last year of observation was 0.3 ± 0.06 diopters, and for the entire observation period - an average of 0.44 diopters / year. The length of the PZO increased by 0.71 ± 0.09 mm. The difference between the values of the enhancement of refraction, GHP and the length of the PZO in children of the main and control groups is statistically significant (p<0.05).

Analysis of results **tab. 1** and **2** shows that children of the main group who wore glasses with perifocal defocus, complete stabilization (and even a slight weakening) of refraction was observed in 62.5% of cases during the first 12-18 months of follow-up and in 48.8% of cases during 3 years old. In children of the control group, these indicators were 26.9 and 0%, respectively. Stabilization of myopia was noted in 41.1% of children in the main group after 4-5 years of follow-up. It should be noted that the observed

the children were at the age of the most active growth and progression of myopia - the average age of children at the beginning of observation was 10.5 years. At this age, spontaneous stabilization within 3 years is observed in no more than 3–7% of cases, and in our study, children in the control group did not have stabilization in any case. In the COMET study, the age of stabilization varied by gender and ethnic group. The mean period of cessation of the progression of myopia fell on the age from 14.44 to 15.28 years for girls and from 15.01 to 16.66 years for boys. At the age of 12, myopia was assessed as stable only in 37% (41 of 112) of Africans, while in other ethnic groups the indicator was significantly lower - 13% (8 out of 62) in Hispanics and 15% (5 out of 33) in Asians [23].

In our study, in addition to 41.1% of children with a stable refraction for 4-5 years, in another 28.6% of children of the main group for the entire period of observation, the progression of myopia was no more than 1.0 diopters (ie the rate of progression up to 0.15 diopters / year), and only in 8.9% of children the refraction increased by more than 2.0 diopters during 4-5 years of observation.

The average HHP for 4.5 years of follow-up was 0.26 diopters / year in children of the main group, and 0.44 diopters / year in the control group.

V **tab. 2** provides comparative data on the rate of myopia progression in children of the study and control groups. Within 12-18 months, the progression of myopia in comparison with the indicators of the control group decreased 1.6 times, after 4-5 years - 1.8 times. Compared to baseline, there was a decrease in progression in 4.7 times. It should be especially noted that there were no cases of development of exo- or esophoria induced by wearing perifocal glasses during the entire observation period.

The results obtained by us in children of the control group coincide with the data of other authors. K. Chung et al. (2002) in children wearing monofocal glasses, myopia progressed within 2 years by 0.77 diopters under the condition of complete correction, and by 1.0 diopters - with incomplete correction [2]. On the contrary, in the observation of Y. Sun et al. (2017) in children 12.7 years old with complete monofocal correction of myopia of a weak degree, the progression was 1.04 diopters in 2 years, in the absence of correction - 0.75 diopters [3].

In both cases, the GGP value varied from 0.5 to 0.38 diopters / year, which corresponds to the values of this indicator in children of our control group.

It should be emphasized that the average age of the children included in our study was 10.5 years. This means that the observation was carried out over children aged 10.5 to 15 years, i.e. during the period of growth of the organism and the most active progression of myopia [10].

conclusions

1. Perifocal glasses form myopic a 15 ° defocus in the nasal and temporal periphery of the retina and 30 ° in the temporal; at 30 ° of the nasal periphery of the retina, the hyperopic defocus decreases by 4 times.

2. Against the background of constant wearing of perifocal points, the rate of progression of myopia in children decreases 4.7 times compared with the initial level and 1.6 times (60%) compared with the indicators in children of the control group.

3. Complete stabilization of myopia against the background of wearing Perifocal glasses in children in prepubertal and pubertal periods were noted in 62.5% of cases within 12-18 months, in 50.0% of cases - within 2 years, in 41.1% of cases - within 4-5 years. In children of the control group, similar indicators were noted in 26.9% of cases within 12-18 months, in 7.7% of cases - within 2 years. In the long term, not a single case of stabilization was noted.

4. Glasses with perifocal defocus can be recommended as a reliable non-invasive optical device that slows down the rate of myopia progression and even stabilizes it.

Contribution of authors:
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The authors declare no conflicts of interest. The authors declare no conflicts of interest.

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Received 07/12/18
Received 07/12/18
Accepted for publication on 30.10.18
Accepted 10/30/18