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Mini Review

A Case of Diagnosis and Treatment of Refractive Amblyopia in a Child Using the Method of "Selecting the Figure in the Background"

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Abstract

Refractive anomalies occupy a leading place among the causes of visual impairment in children and adolescents. Refractive amblyopia - visual loss (with optimal optical correction), which is not associated with organic changes in the eyeballor visual pathway, is one of the most widespread types of amblyopia [4,8,9,11].

Cases of refractive amblyopia arise mainly on the background of astigmatism - more often hypermetropia, less commonly myopic.

The most commonly seen in early childhood and preschool age is hypermetropic refraction- 78 - 80%. Hypermetropia of high degree and complicated hypermetropic astigmatism appear in children of this age in 20%. The greatest reduction in visual acuity is due to the presence of hypermetropia of medium, high degree, complicated hypermetropic or mixed astigmatism [5,6,9].

In the development of refractive amblyopia, the essential role is played by the inertia of the commodative apparatus, which develops due to the inability to overcome the defect of the optical structure of the eye (limited possibilities of uneven accommodation). Such patients have low visual acuity for the near, when the accommodation function is especially needed [9,12].

Keywords: *Refractive Amblyopia; Contrast Sensitivity (Lea Test); Method of "Selecting the Figure in the Background"*

The efficacy of treatment for refractive amblyopia depends on timely, as early as possible adequate correction of astrocytopenia [3-6], since the most achieve functional development of the visual system occurs from birth to 6 - 8 years (S.E. Avetisov, T.P. Kashchenko, A.M. Shamshinova, 2005). The effect of optical correction is more pronounced at junior school age and practically absent in adolescence. However, in children, only one correction of the existing refractive anomaly does not always allow achieving the result, especially if the visual acuity of the amblyopic eye is less than 0.3 - 0.4 (average and high degree of amblyopia [1,9,14].

From 2% to 9.6% of children in the structure of ophthalmic pathology suffer from amblyopia [2,13]. That is why the purpose of the study is to increase the effectiveness of diagnosis and treatment of children with refractive amblyopia based on visual perception data obtained using the method of "selection of the figure in the background".

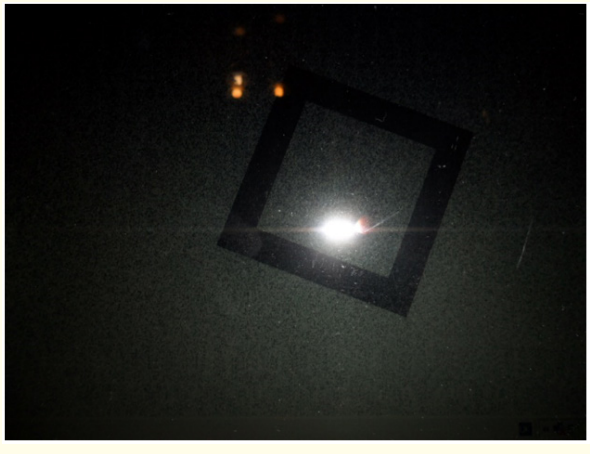
The "pattern selection" method is a stimulation pattern, consisting of a diagnosis and therapeutic set of geometric shapes that are presented to the patient at a distance of 40 cm to identify the background and. Which he must fix. The basis of this method is to determine the presence of violations of visual perception on based on the assessment of the informativeness of the visual perception by measuring the speed of the recognition of objects (visual gnosis), due to which it becomes possible to detect lesions of the neurastructures of the visual sensory system and those psycho-functional systems of the brain that are involved in providing visual perception [2,7]. Estimation of the informative level of visual perception consists in the use of images with a gradual smooth level of intensity and brightness of the

contour, which allows to clearly define the individual's ability to identify the visual image [2,7]. The stimulation pattern for the diagnostic purpose consists of a set of ten geometric shapes, which "appear in the center of the background with varying intensity and brightness of the contour, are changing one after another. The stimulation pattern for the therapeutic purpose also consists of a set of ten geometric figures that are much smaller in size, moving along the screen plane. Frequency of change of transparency (mSek)-500; minimum size of the figure (% of the screen size)-10; maximum figure size (% of screen size)-10; minimum width of the contour-5 mm; maximum width of the circuit -10 mm [2,7].

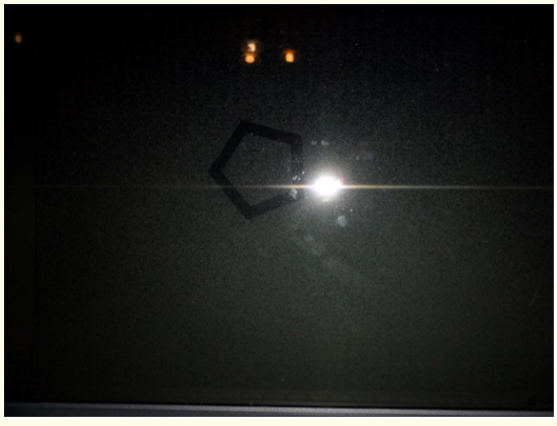
The advantages of this method is that it is non-contact, painless, interesting to children and well tolerated. The application of the method allows the visual system to train the multichannel structure of the transmission of information to the cerebral cortex. Due to the multiple exposure to the visual system, the training of information fovea-cortical channels, including the channels responsible for the transmission of information about localization, is achieved, and thus provides an increase in noon-muscular or hyper-visual sight. The training of non-visual acuity in children with amblyopia promotes the training of the eye's ability to recognize visual acuity and increase the visual acuity of amblyopic eyes - thus increasing the effectiveness of treatment and reducing the timing of treatment [10]. Stimulation is carried out at a distance of 40 cm, that is, the size of the projection will be within the limits of the phaeolus. The basis of this method is the purpose of influencing (stimulating) information fovea-cortical channels, specialized in the perception of light, brightness, contrast, shape and size, as well as channels responsible for the transmission of information about the mutual location, and hence increased visual acuity. Diagnosis and stimulation with this method was performed monocularly without correction, monocular in correction and binocular. In addition, this method is aimed at the restoration of not only sensory links, but also sensory-motor, therefore provides a combination of pleoptic, orthopic and stereo-optic effects in one treatment procedure. However, there are disadvantages of this method: subtle studies of the last decades of anatomy and the physiology of visual mechanisms by physiologists have shown that the visual pathways from the retina to the visual cortex contain a multitude of structural elements of highly specialized to a large variety of shape, size, color, and details of the perceiving optical image. These features of the visual path correspond to the features of the external environment, under the influence of which continues to develop and form a visual analyzer after the birth of the child. This is not taken into account in the method of treatment by the method of "selecting the figure against the background", as there are no colors in the stimulating object.

The definition of visual acuity was carried out according to the tables of Golovin-Sivtsev. The character of the vision was determined by the four-point colorist of Bialystok-Friedman [2,7,10]. Contrast sensitivity was determined using the Lea test at a distance of 45 cm. Lea Symbols Low Contrast Test, 10M Test for quick measurement of low contrast visual acuity at 25%, 10%, 5%, 2.5% and 1.25% contrast by measuring the distance where the symbols are seen.

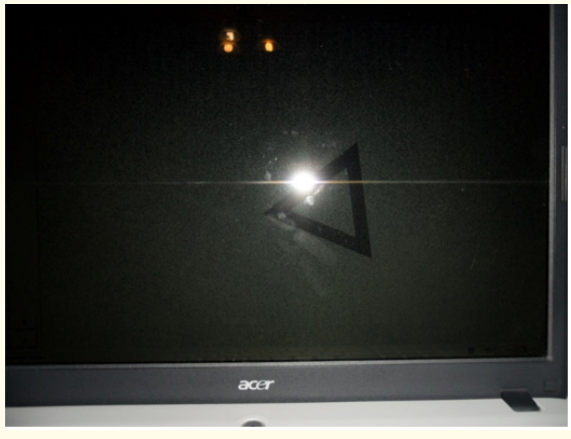
The method of "selecting the figure in the background" (Picture 1, 2, 3). The Lea test (Picture 4, 5, 6, 7, 8, 9).



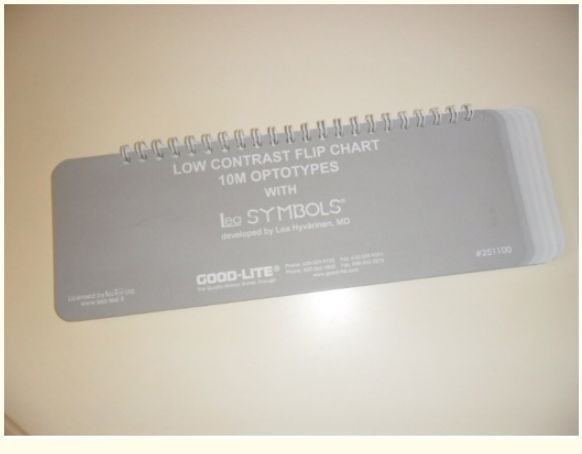
Picture 1



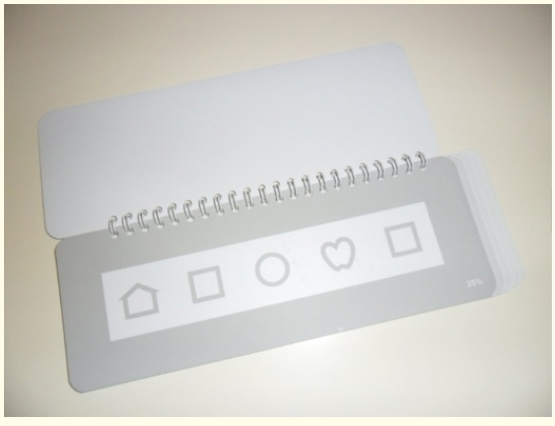
Picture 2



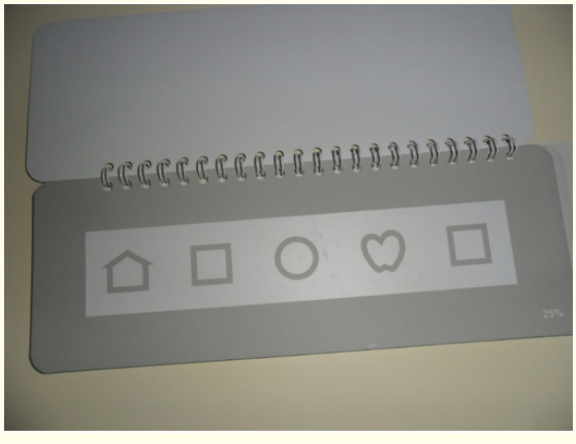
Picture 3



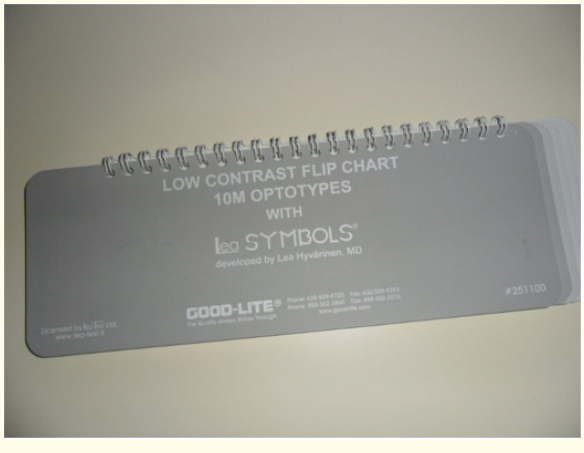
Picture 4



Picture 5



Picture 6



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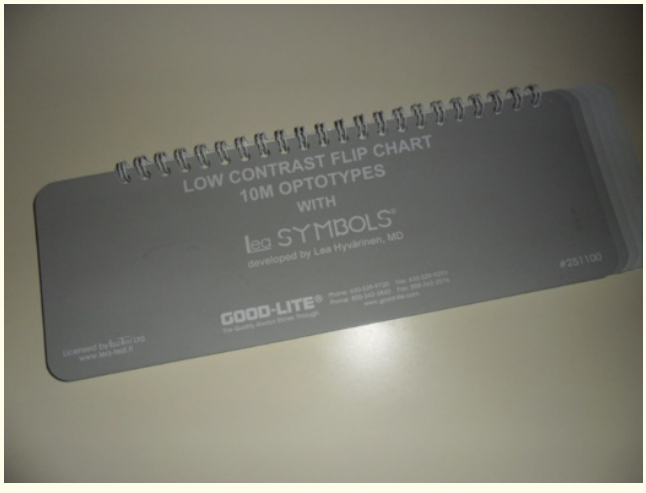
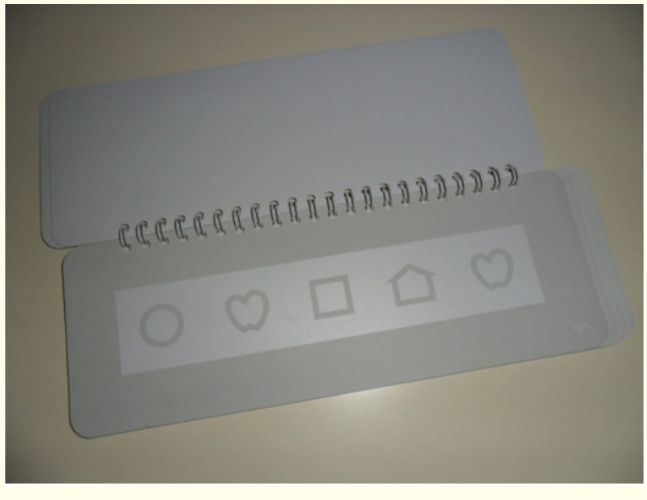


Picture 8



Picture 9

The state of visual functions to treatment in a patient with a moderate refractive amblyopia

	Eye right	eye left
Visual acuity without correction	0.08	0.08
Visual acuity in the correction	sph+0.75=cyl+3.5ax90=0.1	sph+2.5=cyl+3.5ax90=0.1
The nature of the view	Is binocular	Is binocular
Contrast sensitivity (Lea test) without correction	5%	5%
Contrast sensitivity (Lea test) in the correction	2.5%	2.5%
Skyscope is dynamic	Hm 1.0\Hm 5.0	Hm 3.0\Hm 6.0

Table 1

The method "selecting the figure in the background" without correction

	Total number of figures	Total time of perception	Average time on 1 figure
Eye right	10 coincided with the received 8	Is 8578.75mSec	Is 8571.875mSec
Eye left	10 coincided with the received 6	Is 33437.5mSec	Is 5572.91mSec

Table 2

The method of "selecting the figure in the background" in the correction

	Total number of figures	Total time of perception	Average time on 1 figure
Eye right	10 coincided with the received 8	Is 66656.25mSec	Is 8332.03125mSec
Eye left	10 coincided with the received 6	Is 60500mSec	Is 10083.3mSec

Table 3: *Ophthalmoscopy: DZN – contours are blurred, pale pink, arterial, full-blooded veins, aa-v ratio of 2:3, macular reflexes are preserved.*

The state of visual functions after treatment in a patient with a moderate refractive amblyopia

	Eye right	Eye left
Visual acuity without correction	0.2	0.2
Visual acuity in the correction	0.5	0.5
The nature of the view	Is binocular	Is binocular
Contrast sensitivity (Lea test) without correction	2.5%	2.5%
Contrast sensitivity (Lea test) in the correction	1.25%	1.25%
Skyscope is dynamic	Hm 1.0\Hm 5.0	Hm 3.0\Hm 6.0

Table 4

The method "selecting the figure in the background" without correction

	Total number of figures	Total time of perception	Average time on 1 figure
Eye right	10 coincided with the received 10	Is 8271.70mSec	Is 8068.8731mSec
Eye left	10 coincided with the received 10	Is 32433.467mSec	Is 4668.81mSec

Table 5

The method "selecting the figure in the background" in the correction

	Total number of figures	Total time of perception	Average time on 1 figure
Eye right	10 coincided with the received 10	Is 63354.18mSec	Is 4128.03123mSec
Eye left	10 coincided with the received 10	Is 58347 mSec	Is 8795mSec

Table 6: *Ophthalmoscopy: DZN-contours are blurred, pale pink, arterial arteries, full-blooded veins, aa-v ratio of 2:3, macular reflexes are preserved.*

Conclusion

As a result of the application of the method of "selection of a figure in the background" for diagnostic and therapeutic purposes, an increase in uncorrected and corrected visual acuity, contrast sensitivity parameters, an increase in the number of perceptions of figures, a decrease in the total time of pattern recognition and an average recognition time of one figure.

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