

RESEARCH OF VISUAL PERCEPTION (VIEW FIELD) IN ADOLESCENTS WITH ICP

Kirillov D.V.

Odessa I.I. Mechnikov National University

Annotation. In the article there are considered the questions concerned with the problem of space perception and disorders analysis that occur in cases of view fields narrowing (loss) in adolescents with ICP. The view field is space that an eye perceives on a fixed look and head position.

Sometimes in the literature there is found a concept of «peripheral vision». Pathology of the nervous system is the main reason for the narrowing (loss) of view field.

In adolescents with ICP (about 20-30% of cases) there are noted the strabismus, diplopia, eye movements coordination disturbances, lowered the upper eyelid (ptosis), involuntary movements of the eyeballs (nystagmus). These features of the visual analyzer lead to defective and in some cases to a distorted perception of objects and phenomena of the surrounding reality [6].

The distortion of the world picture on the perception level entails the deformation of the methods and products of thinking and imagination. Visual narrowing of the space perception is one of the basic mental functions because the vision is the leading channel for getting information about the external world. Therefore the compensation of visual perception development defects seems to be a very important task for the full development of adolescent, the formation and implementation of training activities, the successful adaptation of adolescent to the surrounding physical and social environment.

Key words: adolescents with ICP, view field, visual distortion of space, time of visual-motor reaction, length of visual-motor reaction, lowered the upper eyelid, involuntary movements of the eyeballs, pathological process localization in CNS.

Problem statement. The distortion of the world picture on the perception level entails the deformation of the methods and products of thinking and imagination. Visual space perception is one of the basic mental functions because the vision is the leading channel for getting information about the external world. Therefore the compensation of visual perception development defects seems to be a very important task for the full development of adolescent, the formation

and implementation of training activities, the successful adaptation of adolescent to the social environment.

The last researches and publications analysis.

Distortion of vision field takes one of leading places in the visual functions structure disturbances on organic CNS lesions. According to recent researches the incidence of narrowing (loss) field of view at strabismus in adolescents with ICP accounts for from 25,7 % to 41.0% [3].

In adolescents with ICP are often observed spatial and optical-spatial disturbances, which are expressed in incorrect transmission of spatial relations between separate subjects or their elements, disturbances of the objects integral image, the wrong objects location and distance perception in the space [4].

The space visual perception disturbance is a multifactorial pathology; therefore the research of functional condition of the visual system in adolescents with ICP deserves special attention.

Research of the visual system (spatial perception) pathology in adolescents with ICP allows creating intervention programmes for compensation of these distortions further. [6]

The purpose of the article: To establish the influence of view field boundaries in adolescents with ICP on the development of space visual perception (expansion, contraction).

Exposition of basic material. Visual perception in adolescents with ICP as a rule is distorted due to the limited movement of the eyes, commits disturbances of sight, the field of vision narrowing, and decreased visual acuity [2].

The difficulty in providing effective qualified assistance to adolescents with ICP which have the visual functions disturbances is caused by a lack of exploration of the Central mechanisms of visual system regulation. According to recent studies in this area it is known that their normal performing is impossible without coordinated interactions of sensorial, oculomotor, accommodative-photoregulatory and nictitating functions of the visual system. As it turned out in the implementation of the visual functions there are directly involved more than 30 areas of the brain. The Central areas of the visual system prone to increase vulnerably on CNS diseases because of the complexity of organization and a wide representation of visual functions in the brain. It is known that the sensorial functions of view suffer on eye movements disturbances for example on acquired nystagmus. In turn oculomotor functions change with a very low vision when disturbs the possibility of fixing the look on an object and thereby worsening

conditions for an accurate perception. Visual perception suffers until the appearance of diplopia or blurred vision on disturbance of accommodation mechanisms due to the disturbance of the nervous control of inner smooth muscles motility which regulate the thickness of the lens and the lumen of the pupil which in turn significantly narrows the field of view.

An important role in the normal performing of visual functions is given tonicitation unity for the nullification of the visual information and reconfiguring the visual system for perception of the new object. It is obvious that a full assessment of the state of visual functions and the reasons for their disturbances are possible while the researching of a larger number of indicators, than it is accepted in accordance with the classical concepts about the organization of view. A limiting factor in effective diagnosis and treatment of diseases of the Central areas of the visual system is the lack or reliable of quantitative methods of assessment of visual functions of the brain[5].

We have developed and taken as the basis the method VSS (visual-spatial selectivity) which aims to identify visual perception disturbances, analysis of color perception pathology. 12 cardboard sheets, each of which has the following colors: white, black, yellow, green, red, blue and brown (main colors); grey, purple, blue, beige and orange (secondary colors). The boundary of the field of view for the color we will consider that position of the object in which respondent has properly recognized its color.

The research was carrying individually on the base of children's specialized clinical sanatorium "Hadzhibey". Time of research: the first half of the day from 11:00 to 12:30. The individual research of adolescents is determined by the instructions of the research performing. The Method VSS 'dilation of view fields' helps to establish the degree of view fields disturbances which occur on CNS damages. Special attention for the assessment of the state of the view field is given to the sensitivity of the Central and peripheral regions of space which participation guarantee the getting oh the principal amount of important visual information [1].

With this in mind we developed a special lighting system with help of which we managed to optimize the process of performing of the experimental method. To estimate the parameters of the total time of visual-motor reaction and the length of visual-motor reaction as well as degree of their deviation from the norm there had been used the data obtained during study in adolescents without deviations in development.

Table 1

**Test results of research 'dilation of view fields' by copyright method VSS
(n=201 with ICP)**

Age (completed years)	Number (N) of respondents								
	Boys			Girls			Total		
	N	t	L	N	t	L	N	t mean	L mean
12	10	480	26	-	-	-	10	480	26
13	18	456	24	5	504	29	23	480	26,5
14	25	468	25	8	492	28	33	480	26,5
15	30	492	28	11	486	28,5	41	489	28,25
16	34	480	25,5	9	480	27,5	43	480	26,5
17	42	492	27,5	9	474	27	51	482	27,25
Total	159	-	-	42	-	-	201	-	-
Mean	-	478	26	-	487	28	-	482	26,85

Note:

N –number of respondents

t - the total time of visual-motor reaction: it is calculated for each color separately and then summed;

L - distance in sm at the moment of the determination of the color (the length of visual-motor reaction).

From the analysis of Table 1 we can make next conclusions:

Among adolescent boys we have identified two age groups: 13 (n=18) and 14 (n=25) years which showed the highest results in the research. The lowest indicators in the method of «dilation of view fields» in groups of 15 (n=30) and 17-year-olds adolescents (n=42). In adolescent girls the highest indicators are in the group of 16 (n=9) and 17-year-olds (n=9). The lowest measure in adolescent girls is in the group of 13-year-olds (n=5). The measures of statistical standards in adolescents with ICP are blocked by 2.5 times in the run-time job (increase) and 1.6 times by the distance at the moment of define the color of the sheet (increase).

The research of these parameters (the total time of visual-motor reaction, distance (sm) at the time of determination of the color) of visual function has allowed revealing the fact that in adolescents with ICP may be relatively normal static acuity and significantly lower dynamic. This shows the differences in the Central mechanisms of static and dynamic visual acuity. Measures of the total time of visual-motor reaction in adolescents with Central disturbances of visual functions on ICP shows that dynamic visual acuity often suffers when there is a disturbance of the functions of the vestibular system, the functions of the parietal cortex and other locations of the pathological process in the Central nervous system that disturbs visual functions. It is worth noting that the objects visible to the color range are seen to be colorless.

Table 2

**Test results of research 'dilation of view fields' by copyright method VSS
(n=200 in norm)**

Age (completed years)	Number (N) of respondents								
	Boys			Girls			Total		
	N	t	L	N	t	L	N	t mean	L mean
12	5	192	15	2	180	16	7	186	15,5
13	10	184	14,5	6	198	18	16	191	16,25
14	18	182	14,5	10	192	17	28	187	15,75
15	27	180	14	7	176	15	34	178	14,5
16	40	166	15	11	172	14	51	169	14,5
17	60	172	14	4	180	15	64	176	14,5
Total	160	-	-	40	-	-	200	-	-
Mean	-	179,3	14,5	-	183	15,85	-	181,15	15,15

Note:

N – number of respondents

t - the total time of visual-motor reaction: it is calculated for each color separately and then summed;

L - distance in sm at the moment of the determination of the color (the length of visual-motor reaction).

From the analysis of Table 2 we can make next conclusions:

All adolescents without development disabilities showed the results above the average. In adolescent boys stands out a group of 16-year-olds (n=40), the overall result which is in the region of the maximal values on the criterion t (overall response time: defined for each color separately and then summed). Minimal results are in a group of 12 year-old boys (n=5). In adolescent girls the maximal measures on the applied method are in the group of 16-year-olds (n=11). Minimal indicators are in the group of 13-year-olds girls (n=6).

Conclusions

1. The usage of the research method of the color sensitivity of the visual system (dilation of the fields of view) at the time of visual-motor reaction (t) and the distance in the time of determination of color (the length of visual-motor reaction to stimuli presented to the spectral composition (12 monochrome pages) implemented in the experimental technique 'the dilation of the fields of view' allows to identify the functional state of the fields of view of the respondents that are caused by factors of deviations in development. Experimental data confirm the high dependence of the condition of the field of view of the respondents (visual perception) to defective and in some cases to a distorted perception of objects and phenomena of the surrounding reality.

2. In adolescents with ICP the dynamic visual acuity, color perception (narrowing of the view fields, loss of vision fields) are significantly reduced due to the pathology of the functions of the parietal cortex (the area of visual radiance) and with the other locations of the pathological process in the Central nervous system (basal tumor, focal inflammations, bleeding and other disturbances of vascular nature) which disturb the visual functions.

3. In adolescents without deviations in the development we revealed an increase in average light sensitivity while reducing the investigated area of the visual field. Time t (the total time of visual-motor reaction on each of the 12 stimuli) is within the high standards.

References

1. Gudkova T.V. Features of the organization in the conduct of correctional work with children with cerebral palsy / T.V. Gudkova // Problems and prospects of

development of education: proceedings of III Intern. nauch. proc. (c. Perm, January 2013). Perm: Mercury, 2013. - p. 97-99.

2. Ivanov V.V., Bakhareva E.L., Bauer O. V., Romanovskaya T.A., Pashnina E.V. Baranova E.V., Amelina A.O., Dubnyak S.S. "Loss of visual apparatus with cerebral disorders in children. Collected papers of scientific and practical conference on ophthalmology / Ed. by M. M. Bickbova.// East - West 2012. Section VII. Ufa-2012. 383 p.

3. Ippolitova M.V., Babenkova R.D., Mastukova E.M. Education of children with cerebral palsy in the family. M., 1993.

4. Ckubarcko A. I., Chuprin B.P., Ckubarcko N. P., Ckubarcko Yu. A. System of computer testing the functions of the visual analyzer. Theory and practice of medicine. Scientific and practical annual № 3. / Ckubarcko A. I. // Minsk - 2002, p. 195-197

5. Shipitsyna L.M., Mamaichuk I.I. Infantile cerebral palsy. SPb.: Publishing house "Didactics Plus", - 2001, 272 p.

6. Lueck C. J., Gilmour D. F, McFiwaine G. G. Journal of Neurology, Neurosurgery, and Psychiatry./Lueck C. J. //- 2004. - Vol. 75. - P. 2-11.