

Comparative analysis of the treatment efficiency of the consequences of congenital transient hypothyroidism

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Abstract--Actuality: Taking into account the primary role of thyroid hormones in the formation and growth of the nervous system in children, the special importance of transient hypothyroidism among other endocrinopathies of newborns and children becomes evident, which makes it necessary to study it further. **Methods:** indications for treatment were: disorders of psychomotor and perceptual functions development, assessment of neuropsychiatric development below 21 points. 60 children were examined, patients were divided into 2 groups: Group 1 - 30 children received Piracetam treatment by the firm " Gedeon Richter ". Patients of the 2nd group (30 children) were prescribed l-thyroxin as monotherapy. The results of treatment were monitored by changing clinical and psychological indicators with MDI scores. The examination was carried out at the beginning of treatment and 3 months after it. **Results:** there was a 1.5 times decrease in hyperexcitability syndrome in the first group and 1.8 times decrease in the second group and in vegeto-visceral dysfunction (9 times and 2 times respectively). Acceleration of mental development rates was noted almost 3 times in the first group and 1.3 times in the second group, as well as a reliable increase of CPR (21.2 ± 1.3 and 25.6 ± 1.4 ; $P < 0.05$), while in the second group there was a noticeable increase of this index (20.1 ± 0.9 and 22.8 ± 1.1 ; $P > 0.05$). It testifies to efficiency of application of complex therapy with prescription of Piracetam. **Conclusion:** the complex therapy with the use of the drug Piracetam for children with congenital transient hypothyroidism helps to timely correct identified mental disorders and can be recommended for the prevention of the mental consequences of CH.

Keywords--CT, children, mental development, hyperexcitability, Piracetam, monotherapy

I INTRODUCTION

In the literature of recent years there is information about the negative impact of CTH on the postnatal adaptation of newborns, as well as on the physical and neuro-psychological development of children in the first

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year of life. Some contradictory studies characterizing homeostatic consequences of transitor thyroid dysfunctions have been carried out. The influence of transiting hypothyroidism on psychosomatic development in comparative age aspect has not been studied. The structure and character of the deficit of cognitive and mental functions in children of preschool and school age who have undergone CTH remain undiscovered.

II RELATED WORK

Numerous studies have found that children living in iodine deficient areas lag behind their peers in the acquisition of school skills, they have reduced cognitive activity, there is a different degree of failure in the basic functions: perception, thinking, fine motor skills [1,2,3].

As it has been established earlier, CTH has an adverse effect on further physical and mental development, which requires timely correction. CTH can lead to partial brain system failure, impaired adaptive behaviors and higher mental functions, including speech [4,5]. It is also known that lesions in the early stages of ontogenesis cause more significant CNS development disorders, especially subcortical lesions, while later (peri- and postnatal) lesions affect the cerebral cortex to a greater extent [6,7]

The prevention of mental disorders is based on early diagnosis and timely administration of adequate treatment methods.

According to recent studies, neuropsychiatric disorders due to transient hypothyroidism cannot be corrected by the postnatal administration of iodine preparations. Plasticity of the brain of a child of early age, high potential for active response to changing external stimuli explain the need for early initiation of treatment and correction of mental disorders in both children with marked abnormalities and children in the risk group with regard to their occurrence [8,9,10].

Early prescription of psychotropic drugs will help to approach the child's future possibilities in a realistic manner. Psychotropic drugs are used very widely, because if used correctly, they can improve the functional state of the nervous system, which creates a favorable background for the stimulation of mental development and development of age-related motor, speech and mental skills. Therapy with psychotropic drugs is applied differently depending on the leading syndrome taking into account the stimulation of general development of functions [11,12,13,14].

III PROPOSED APPROACH

All the aforesaid has defined the further purpose of our research - efficiency of complex therapy of mental function development disorders in children who have suffered with CH.

Taking into account the primary role of thyroid hormones in the formation and growth of the nervous system in children, the special importance of transient hypothyroidism among other endocrinopathies of newborns and children becomes evident, which makes it necessary to study it further. Methods: indications for treatment were: disorders of psychomotor and perceptual functions development, assessment of neuropsychiatric development below 21 points. 60 children were examined, patients were divided into 2 groups: Group 1 - 30

children received Piracetam treatment by the firm " Gedeon Richter ". Patients of the 2nd group (30 children) were prescribed l-thyroxin as monotherapy.

IV EXPERIMENTAL SETUP

There were following indications for treatment disorders of the development of psychomotor and perceptual functions, assessment of neuro-psychiatric development below 21 points, parental consent for treatment.

At the beginning of treatment the age of the children was from 3 months to 1 year. The results of treatment were monitored according to the change of clinical and psychic indicators with the MDI score in points.

60 children were surveyed, patients were divided into 2 groups: Group 1 - 30 children received the Piracetam treatment by Gedeon Richter. The course of treatment included 10 intramuscular injections of the drug in a dose of 50-70 mg/kg divided into 2 intakes in the morning and daytime hours, inwards, during 6 weeks. Considering the presence of hypothyroid conditions in children, the drug of sodium levotiroxin-L-tyroxin group (Berlin-Hemi) was chosen as a substitution therapy. Dose of the drug and duration of treatment were calculated depending on weight, age, degree of enlargement and functional state of thyroid gland. Dose correction was performed together with endocrinologists at short courses (usually 3-4 weeks).

Patients of the 2nd group (30 children) were prescribed L-tyroxin as monotherapy in the daily dose.

The treatment of mental disorders in children with VTH in outpatient settings was carried out in a comprehensive manner. Along with the use of Piracetam, vitamins for metabolism in the CNS were also prescribed, assuming their indispensable participation in carbohydrate metabolism and oxidation processes; (B1-6% 1.0 ml, B6-1% 1.0 ml intramuscularly, 10 injections a day; vitamin C-0.1g - 3 times a day) Dehydration therapy was also prescribed. Diacarb 0,02g/kg/day was used for this purpose according to the scheme: - 3 days admission - 1 day break, course up to 2 weeks, with the addition of potassium medication. At obvious neurotic symptoms (fear, acute emotional excitability, fussiness, etc.) small-scale tranquilizers were recommended; the initial dose of elenium 5-10 mg per day was increased to 30 mg if necessary. Doses of seduxenes ranged from 2.5 to 20 mg.

In addition to drug treatment in both groups a complex of physiotherapeutic procedures was used according to indications.

The results of treatment were monitored according to changes in clinical and psychological indicators with MDI scores. The examination was performed at the beginning of treatment and in 3 months after it.

V RESULTS

Research results: In connection with the above, we studied the effect of Piracetam on the neuro-psychiatric development of children who have undergone congenital transient hypothyroidism. The choice of this drug is associated with its complex nootropic effect on higher nervous activity and has a positive effect on behavior, motor skills, attention and memory. It provides a distinct clinical improvement in the condition of children and adolescents with mental development delays. The mechanism of action of Piracetam aims at increasing the metabolism of

glucose in brain tissues, increasing the level of ATP in nerve cells and increasing metabolism, improves neuropsychic functions.

Studying the structure of mental disorders in children in both groups in most cases revealed a delay in psychomotor development (71.1% and 66.6% respectively). Hypovoeexcitability syndrome was less observed in both groups (6.8% and 9.3%, respectively) (Table 1).

Table 1 Structure of mental disorders in examined children with CH

Disorders	Groups of children			
	First group		Second group	
	Abs*	%	Abs*	%
Hyperexcitability syndrome	6	20	5	16,6
Vegeto-visceral dysfunction syndrome	3	9,3	2	6,6
Delay in psychomotor development	21	71,1	20	66,6
Hypoexcitability syndrome	2	6,8	3	9,3

Note: *- Disorders occurred in the same patient, so the absolute sum of results does not match the number of patients.

Thus, both groups were practically similar in structure of mental development disorders. It makes it possible to estimate the efficiency of the chosen complex treatment of the consequences of congenital transient hypothyroidic conditions.

It is necessary to note the reduction of mental development disorders intensity in comparison with the period before treatment in both groups (Table 2).

Table 2 Structure of mental disorders in examined children with CH after treatment

Disorders	Groups of children			
	First group		Second group	
	Abs*	%	Abs*	%
Hyperexcitability syndrome	4	13,3	3	9,3
Vegeto-visceral dysfunction syndrome	0	0	1	3,3
Delay in psychomotor development	8	26,7	15	50
Hypoexcitability syndrome	1	3,3	3	9,3

Note: *- Disorders occurred in the same patient, so the absolute sum of results does not match the number of patients.

As can be seen from Table 2, there was a 1.5 times decrease in hyperexcitability syndrome in the first group and 1.8 times decrease in the second group and in vegan-vegeto-visceral dysfunctions (9 times and 2 times respectively). Acceleration of mental development rates was noted almost 3 times in the first group and 1.3 times in the second group.

Positive dynamics in the condition of children undergoing complex therapy (the 1st group) was revealed rather quickly, and these changes intensified during 6 weeks of treatment.

The advantage of Piracetam treatment in comparison with the second group was also demonstrated by the dynamics of mental development coefficient (MDI) indicators. Treatment outcomes were monitored for changes in clinical and neurological indicators with MDI scores.

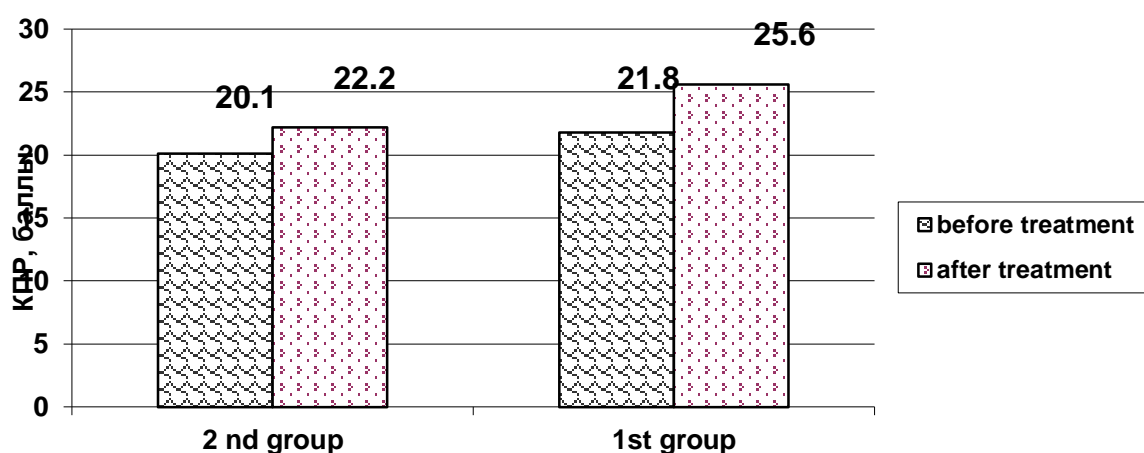


Fig.1 Dynamics of MDI in children under the influence of treatment

As can be seen from the chart, Group 1 shows a significant increase in the MDI (21.2 ± 1.3 and 25.6 ± 1.4 ; $P < 0.05$), while Group 2 shows a significant increase in this indicator (20.1 ± 0.9 and 22.8 ± 1.1 ; $P > 0.05$). It testifies to efficiency of application of complex therapy with prescription of Piracetam.

The transferability of Piracetam was assessed as "good". Hyperexcitability and irritability were reported in two cases (6.7 per cent) during treatment, which were observed at the beginning of treatment and were of a transient nature.

Comparative analysis of neuropsychiatric functions in both groups shows that with slight differences in the results of some indicators before treatment, only children receiving Piracetam were scored higher. Its influence on the improvement of speech functions, as well as motor and behavior was noted to a greater extent, but no direct influence on the increase of muscle strength in the extremities, reduction of hyperexcitability syndrome and timely reduction of physiological reflexes in newborns, reduction of the intensity of vegeto-visceral dysfunction syndrome was revealed.

VICONCLUSION

The complex treatment, including Piracetam, helped to increase the total MDI more significantly in comparison with the same indicator in children who received only L-tyroxine.

According to some authors, insufficient intake of iodine into the body leads to congenital disturbance of higher mental functions, formation of mental retardation in severe cases, and in the mild - borderline or partial intellectual impairments [14,15].

In assessing the neuro-psychiatric development of children who have undergone transient congenital hypothyroidism, lower rates of behavior and cognition were noted in comparison with healthy peers. The revealed features of neurological status in the form of speech disorders turned out to be, in general, the leading ones in the main group. The noted partial cognitive deficit of various degrees in children of the main group was the motive for search and administration of nootropic drugs that improve metabolic and cognitive functions of the central nervous system [16,17,18].

Analysis of treatment results showed that in children with CRC below 21 scores receiving Piracetam complex treatment contributed to more evident positive changes in mental status, manifested by improved speech and statomotor functions, than in children receiving only hormone replacement therapy.

In children undergoing comprehensive treatment, there was a significant improvement in motor and behavioural function and an increase of almost 4 points in MDI. It should be noted that the effect of Piracetam was observed on the 14th day of its intake and reached its maximum on the 42nd. Piracetam practically did not cause side effects.

Conclusion

Thus, observation of children who have suffered with congenital transient hypothyroidism testifies to insufficiency of neuropsychic activity and necessity of prescription of nootropic drugs. The optimal effect is observed when using the drug Piracetam for 6-8 weeks.

As the assessment of neuropsychiatric functions in children receiving L-tyroxin shows, hormone replacement therapy has a positive effect on the general condition. However, a more evident impact on the partial functions of the intellect has Piracetam.

Complex therapy with the drug Piracetam children with congenital transient hypothyroidism supports the timely correction of identified mental disorders and may be recommended for the prevention of the mental consequences of CH.

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