

# Modern technologies of improving output outcome of delay of intra-growth and development in babies

## Abstract

Based on the study of anamnesis, resistance, physical and neuropsychic development, adaptation, functioning of the autonomic nervous and cardiovascular systems, ways of improving the system of donor diagnosis, clinical examination, rehabilitation/rehabilitation of outcomes of intrauterine growth retardation and development in infants.

**Keywords:** retardation of intrauterine growth and development, infants

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## Relevance

The need to focus on early diagnosis of donorological conditions, preserve and promote health in children born in the outcome of complicated pregnancies, including retarded growth and development of the fetus, in women with a weighed somatic and gynecological history in early postnatal ontogenesis determines the urgency of the research emphasizes the importance of a personified approach in the system of dispensary observation and the timeliness of habilitation/rehabilitation technologies, more often non-medicamentous which will result in minimization of the consequences of intrauterine growth and development delay (ZVURR), and will increase the social adaptation of such children.

## Target

To improve the outcomes of ZVURR in term infants by improving the system of donor diagnosis, clinical examination, habilitation/rehabilitation.

## Methodology and methods

A non-randomized, controlled, comparative, prospective, cohort study was conducted at the perinatal centers of the Federal State Budget Educational Institution of Higher Education "St. Petersburg State Pediatric Medical University" of the Russian Ministry of Health and the Federal State Budgetary Agency "National Medical Research Center named after VA Almazov" Ministry of Health of Russia, St. Petersburg, Russia. A set of material was carried out in the department of physiology of newborns. Later the children and their legal representatives were invited to the consultative and diagnostic department.

The criteria for inclusion of the study participants in the compared groups were the presence of physiologically occurring pregnancies in practically healthy mothers and complicated pregnancies, including IRDT, and also without women who had a weighed somatic and gynecological history, as well as voluntary informed consent. The criterion of non-inclusion of the participants in the study was the IRRP caused by hereditary and infectious factors. The criterion for

the exclusion of study participants is the voluntary refusal of legal representatives. Participation in the study was terminated at the request of legal representatives and with the end of the planned observation period.

The study included 166 full-term newborns, followed by observation for 12 months. Inclusion of children occurred in parallel, from birth. The duration of the period of inclusion in the study is 6 months. The duration of the follow-up period was 1 year 6 months. Intermediate observation points: early neonatal period, 1, 3, 6, 12 months of life. The offset of the scheduled time intervals did not occur. Medical intervention is planned as needed.

Of the 166 newborns, 72 (25 boys and 47 girls) of the child were born in the outcome of complicated pregnancies, including the ZRRP (group 1) and 69 (34 boys and 35 girls) of children, were born in the outcome of complicated pregnancies, but without the IRS (2nd group), mothers who had a weighed somatic and gynecological anamnesis. Symmetric type of ZVURR was diagnosed in 15 (20.83%) (1b subgroup), asymmetric type of ZVURR - in 57 (79.17%) (1a subgroup) of patients of the 1st group. Comparing the clinical manifestations of ZVURR and the diagnosis of the 10th revision of the ICD, we note the following: ZVURR with hypotrophy = small for gestational age fetus (P 05.0); ZVURR without hypotrophy = small fetal size for gestational age (P 05.1); intrauterine malnutrition = malnutrition of the fetus without mention of low or small size (R 05.2). Practically healthy children born to the vaginal route as a result of physiologically occurring pregnancies from practically healthy mothers were the 3rd group - 25 (12 boys and 13 girls) children. The frequency and duration of breastfeeding of the children of the 1st, 2nd, 3rd group, respectively, did not differ significantly.

In addition, in infants about In addition, the babies were analyzed the state of the autonomic nervous system and adaptive resources for various methods of birth, the dynamics of changes in the cardiovascular system, the relationship of vegetative reactivity with the state of the cardiovascular system, revealed the consequences of anemia of pregnant and neonatal hypoglycemia.

We studied the anamnesis. The structure of the diagnoses corresponded to the classification of the ICD X revision. The state of children's health was assessed in accordance with the guidelines of RMAPO ("Diagnosis and prevention of early deviations in the state of children's health", Moscow, 1993). The degree of resistance was determined by the multiplicity of acute illnesses borne by the child during the year, with the calculation of the index of acute diseases. Calculations were made, an estimation of morbidity rates by groups. Physical development was characterized with the use of centrifugal tables and indexes: Vervek in the modification of IM Vorontsov, Cole, Brock. Neuropsychic development - according to the method developed at the Department of Physiology of Development and Education of Children of the Russian Medical Academy of Postgraduate Education. The functioning of the autonomic nervous system was investigated using the method of cardiointervalography. The initial vegetative tone, vegetative reactivity was assessed. The degree of adaptation was characterized by the classification of RM Baevsky (1979) in the modification of LV Kozlova (1994). Electrocardiography was performed according to a standard procedure with the help of EC1T-1/3-07 electrocardiograph Axion (Izhevsk). Neurosonography, Echocardiography with dopplerography was performed on diagnostic ultrasound devices Philips iE33 (The Netherlands), GE Healthcare - Vivid 7 Expert (USA) according to standard methods. The parameters of the functioning of the cardiovascular system were assessed according to the percentile tables, taking into account the mass-growth parameters and the sex of the patient at the time of the survey. General clinical tests were performed according to standard procedures.

Any specific factors that could affect the external generalizability of the findings are not recorded. Additional results are not preliminary planned. Adverse events were absent. There were no significant restrictions. All stages of the study were in accordance with Russian legislation, international ethical standards and regulatory documents of research organizations, approved by the relevant committees, including the ethics committee of the Federal State Budget Office "North-West Federal Medical Research Center named after VA Almazov" of the Ministry of Health of Russia (extract from the protocol No. 59 of 17.03.2014). The analysis of the obtained results was carried out using modern methods of statistical processing.

## Results

- A. At ZVURR, children were born from adult fathers (33.0±6years,  $p<0.05$ ) and mothers (29.51±4.99 years,  $p<0.05$ ), from mothers with lower weight-bearing parameters to pregnancy (body weight 60.51±12.29 kg, body length 164.18±6.2cm,  $p<0.05$ ), 1 pregnancy (47.22%) and childbirth (69.44%). In women, chronic chronic extragenital (90.28%,  $p<0.05$ ) and genital (52.78%) pathology, abortions (34.72%) were recorded. Pregnancy was complicated by a lesser weight gain (9.78±5.1kg,  $p<0.05$ ), with early toxicity of mild to moderate severity (8.33%), a threat of interruption (26.39%), hematologic abnormalities (70.83%), mild to moderate moderate pre-eclampsia (23.61%), gestational diabetes (13.89%), amniotic fluid (66.67% prevalence), amniotic fluid (16.67%). A childbirth - premature rupture of amniotic membranes (40.28%,  $p<0.05$ ), anhydrous interval of 12hours or more (9.72%), weakness of labor activity (5.56%). Hypoxia in the fetus (54.17%,  $p<0.05$ ) promoted operative delivery (23.61%), and vaginal delivery was more often complicated ( $p<0.05$ ) 2.23times by an incorrect fetal position, in 3, 83times the passage of meconium into the amniotic fluid.<sup>1</sup>
- B. In the symmetrical type of ZVURR in comparison with asymmetric children were born from adult fathers (34.07±7.41years,  $p<0.05$ ) and young mothers (28.4±4.21years,  $p<0.05$ ) s less body weight (56.27±8.43kg,  $p<0.05$ ) and a comparable body length (164.33±6.59cm) before pregnancy; less burdened somatic anamnesis; a higher incidence of abortions in the history (40%,  $p<0.05$ ); from 1 pregnancy (46.67%,  $p<0.05$ ), complicated from early terms: threat of interruption (40%), pre-eclampsia of mild and moderate severity (26.67%), Rh-immunization without growth of antibody titer (13.33%), edema (20%), hematologic abnormalities (66.67%), gestational diabetes (6.67%), hypertension (6.67%), and malnutrition (66.67%); from 1 genera (80%), accompanied by premature rupture of amniotic membranes (33.33%), vaginal (53.33%), but the cesarean section rate in 2,(33.33%), vaginal (53.33%), but the rate of cesarean section is 2.66 times higher (46.67%,  $p<0.05$ ). Vaginal births were more often complicated by the meconium escaping into the amniotic fluid, the heart rate change in the fetus. Fruits that had an asymmetric type of ZVURR, often tolerated hypoxia (64.91%,  $p<0.05$ ).<sup>2</sup>
- C. In infants, the frequency of transient states (86.11%), central nervous lesions (65.28%) and cardiovascular (74.42%) systems, the incidence of rickets (569.44‰) is higher ( $p<0.05$ ).<sup>1,3</sup> In the case of a symmetric type of ZVURR, the incidence of respiratory infections (933.33‰), rickets (866.67‰), anemia (866.67‰), the incidence of cryptorchidism (at 7, 62 times), the severity and duration of the lesion of the central nervous and cardiovascular systems (in each child).<sup>2</sup>
- D. In the case of ZVURP, infants had less anthropometric indices ( $p<0.0001$ ), greater frequency and severity of hypotrophy (93.47%,  $p<0.05$ ),<sup>4</sup> since the first half of the year, the severity and the delay frequency neuropsychic development (72.73%,  $p<0.05$ ).<sup>5</sup> In the symmetric type of ZVURR, in contrast to the asymmetric in infants, significant changes were recorded in each child.
- E. In ZVURR, a significant frequency, degree of severity, and duration of registration of clinical manifestations of autonomic dysfunction were detected in 69.09% of infants ( $p<0.05$ ).<sup>6</sup> In the symmetric type of ZVURR, in contrast to the asymmetric type in infants, pronounced changes were determined.<sup>7</sup>
- F. In ZVURR, a significant incidence of changes in the myocardium was revealed (74.42%,  $p<0.05$ ), the deflection of the anterior valve of the mitral valve (4.7 times higher,  $p<0.05$ ) in infants.<sup>8,9</sup> ZVURR in infants in the first half of the year complicates the course of changes in the cardiovascular system, such as dilated hypertrophic cardiopathy, vegetative regulation disorders in normal cardiac cavities ( $p<0.05$ ).<sup>10</sup> In the symmetric type of ZVURR, unlike the asymmetric type in infants, the frequency and degree of severity of the cardiovascular system, which is significant at 6 and 12months, and the malformations of its development, are significantly higher.<sup>11</sup>
- G. Vaginal birth is associated with a significantly lower frequency and severity of clinical manifestations of autonomic dysfunction, the best adaptation in newborns who underwent ZVURR.<sup>12</sup>
- H. ZVURR in combination with anemia of pregnant women are associated with anthropometric parameters, frequency and severity, duration of registration of transitional states, changes in central nervous and cardiovascular systems in newborns.<sup>13</sup>

- I. ZVURR in combination with neonatal hypoglycemia worsened the state of health in newborns, which is confirmed by the reliably frequent diagnosis of donor changes with the help of instrumental methods of investigation.<sup>14</sup>
- J. With ZVURR, donor diagnostic criteria allowed to determine the critical periods of growth and development in infants. The model of dispensary observation (inclusion of a child cardiologist and a neurologist from the maternity hospital stage with the preparation of a personalized dispensarization algorithm with subsequent correction in the out-patient clinic) and treatment-prophylactic technologies in the form of regimen, hardening, phyto- and metabolic therapy, improving the quality of life and health status in infants who have undergone ZVURR.

## Conclusion

ZVURR is a significant factor in the deterioration of health (resistance, physical and neuropsychic development, adaptation, functioning of the autonomic nervous and cardiovascular systems) in infants. Changes are related to its type, require personalized corrective technologies.

## Practical recommendations

- A. At ZVURR, neonatologists, pediatricians are obliged to conduct a comprehensive examination to identify the characteristics of physical and neuropsychic development, the functioning of the central nervous and cardiovascular systems, and compile a personalized algorithm for clinical examination and habilitation/rehabilitation technologies in infants.
- B. Newborns who underwent ZVURR in early neonatal period need a consultation of a pediatric cardiologist followed by a personified dispensary observation in an outpatient and polyclinic link. In the observation group, children who had a disruption in the harmony of physical development, perinatal involvement of the central nervous system, hypoglycemia, hypersympathicotonia, hypersympathicotonia combined with asymptoticotonic or hypersympathicotonic vegetative reactivity, changes in the P, Q, R, S, T, U, segments (segments - PQ, R (S) T and intervals - PQ, QRS, QT, TP, RR, QT1, T1T), valve function and fetal communications, interatrial and interventricular septums, functional ear Very and ejection fraction, end-diastolic and left ventricular systolic volume, stroke volume and minute born by caesarean section as well as from women undergoing anemia during pregnancy preservation or appearance of changes in the teeth P, Q, R, S, T, U, segments (segments - PQ, R (S) T and intervals - PQ, QRS, QT, TP, RR, QT1, T1T), fetal communications, valvular apparatus, interatrial and interventricular septa, functional shortening and ejection fraction, terminal diastolic and systolic volume of the left ventricle, impact and minute volumes.
- C. Anemia, atopic dermatitis, rickets, frequent ARVI. These criteria were the basis for the reassessment of anamnestic data with a revision of the previously compiled and the development of a new personified plan for medical examination and habilitation/rehabilitation technologies in the outpatient clinic.
- D. ZVURR, hypersympathicotonia and asymptoticotonic vegetative reactivity in newborns - risk factor for deflection of the anterior valve of the mitral valve, reduction of contractile and disturbance of the relaxation function, and ZVURR, hypersipa-

tikotonia, hypersympathicotonic vegetative reactivity - risk factor for thickening of the interventricular septum and posterior wall of the left ventricle, disturbance of the relaxation function.

- E. Newborns who underwent ZVURR in the early neonatal period need consultation of a neurologist with a subsequent personified dispensary observation in an outpatient clinic with the goal of correcting the delay of neuropsychic development.
- F. In order to prevent vegetative dysfunction, to improve adaptation to infants who underwent ZVURR, compliance with the regimen, hardening, carrying out fitovannochki and metabolic therapy is recommended. The beginning of therapy, its type, the need for repeated courses were determined individually, taking into account the data of instrumental research methods.

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## Conflict of interest

Author declares that there is no conflict of interest.

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