giant fetus: high risk in 2 women, possible risk also in 2 women; all of them underwent cesarean section. Low frequency of subclinical bone pelvis narrowing revelation by means a external examination may lead to late intranatal diagnostics of this pathology. MR pelvimetry revealed subclinical bone pelvis narrowing and determined the grade of it in 100% of cases. Having additional fetometric data helps to evaluate shoulder distocia risk before the delivery.

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CORRELATION BETWEEN SEVERITY OF FORMER DISEASES IN NEONATAL PERIOD AND LONG-TERM MORBIDITY.

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SUMMARY

КОРРЕЛЯЦИОННАЯ ЗАВИСИМОСТЬ ТЯЖЕСТИ ЗАБОЛЕВАНИЯ В НЕОНАТАЛЬНОМ ПЕРИОДЕ И ЗАБОЛЕВАЕМОСТЬ НОВОРОЖДЕННЫХ НА FOLLOW-UP

Цель: *выявить корреляции между тяжестью патологии неонатального периода и особенностями заболеваемости в школьном возрасте.*

Методы: *обследованы 136 детей в возрасте 8-11 лет, лечившихся в отделении реанимации и интенсивной терапии ДГБ№1 Санкт-Петербурга. Исследование ретроспективное со сплошной выборкой. Гестационный возраст новорожденных составил 28-42 недели. Тяжесть перенесенной неонатальной патологии была ретроспективно оценена в соответствии со шкалой тяжести состояния для новорожденных - NTISS. Данные антропометрии, наличие аномалий развития, острые и хронические заболевания в возрасте 8-11 лет оценивались на основании клинического осмотра, анализа медицинской документации и функциональных тестов.*

Результаты: *на основании суммы посуточных оценок по шкале NTISS за весь период наблюдения в ОРИТН дети были разделены на пять групп. Диагноз и срок гестации не учитывался при разделении на 5 групп: I группа — оцен-*

ка по шкале NTISS 0-20 баллов (24 ребенка); II группа – 24-50 баллов (46 детей); III группа – 57-119 баллов (32 ребенка); IV группы – 123-247 баллов (17 детей); V группы – 277-630 баллов (17 детей). Диагноз и срок гестации не учитывались при разделении на группы.

Характеристика состояния здоровья детей в возрасте 8-11 лет дана по 30 параметрам Структурные аномалии 2 и более систем органов выявлены у 88 (65%) детей, дисгармоничное физическое развитие отмечено у 59 (43%) детей, 91 (67%) ребенок имел 3 и более хронических заболевания.

От I к V группе увеличивалось количество детей, имеющих в возрасте 8-11 лет патологию различных систем органов. Число детей с множественными проблемами возрастало от 20 % в I группе до 80 % в V группе . Однако, ни по одному из 30 параметров, взятому отдельно, нет достоверных различий между группами.

Методом дискриминантного анализа получена математическая модель, на основании которой с определенной долей вероятности прогнозировалась принадлежность детей к той или иной группе тяжести течения болезни в неонатальном периоде. В дискриминантную модель в качестве набора признаков включены все 30 параметров, использованных для характеристики состояния здоровья детей в возрасте 8-11 лет. Работоспособность модели составила 89,8% (по группам от 73,3% до 100%). Наибольшую информационную значимость для построения модели (> 90 %, p < 0,1) имели 16 из 30 параметров, однако, при исключении какого-либо параметра, даже имеющего относительно низкую для построения модели значимость, информативность модели снижалась.

Выводы: У детей, получавших лечение на ОРИТН выявлена высокая частота структурных аномалий развития и хронических заболеваний. Выявлена сильная корреляция между тяжестью состояния в неонатальном периоде и состоянием здоровья в катамнезе

Introduction. The study of growth, development and morbidity of children with different diseases in perinatal period is constantly very relevant. Partially this point is connected with the continuing improvement of medical technology, survival of newborn with severe diseases and the need to evaluate the effectiveness of various methods of treatments, including long-term results. But especially high interest to this problem stems from the fact of raised frequency of follow-up chronic diseases in such population including non-direct outcome of the perinatal problems [1].

At the present time there is a discrepancy between evidence-based high-tech nursing infants and their subsequent observation. Lack of evidence-based methodology of monitoring and medical care of these patients causes great difficulty in the allocation of priorities, aimed at correcting their physical condition [2].

Neurological disorders, morbidity of respiratory system, long-term problems of prematurity studied most intensively. However, catamnestic research built on the allocation of separate diagnosis or the organ system, or a certain period of gestation, or method of treatment allowing to decide separate tasks, do not identify general regularities in the forming of children's health.

Health status in catamnesis can be seen as result of constitutional peculiarities and the impact of former diseases in the newborn period. Effect of neonatal illness on the one hand is related with development of the child, formation of infringement due to destructive changes in the organs and tissues and aftereffect experienced extreme states (postresuscitation disease). On the other hand, this effect is associated with the age of the patient. Delay in the rate of growth and differentiation of tissues, malformation of functional connections in the organism, psycho-emotional mal-

adjustment (duration of separation from the mother, amount of negative information received by a child) are extremely important in the neonatal period.

As to our view it is necessary to identify regularities in the formation of health in catamnesis to use approaches that assess the impact of integrative total range of factors related to the presence of newborn's disease. As such as generalizing characteristics can be used by the *integrative assessment of severity of neonatal disease* [3,4]. The severity of disease is a criterion which allows children to unite in one quality attribute, regardless of nosology. With increasing of the severity of disease the effect on the child of all the related factors also increases.

In neonatal practice there are different scales of severity (NTISS, SNAP, CRIB, NEOMOD, PRISM, NSS, TRIPS, etc.). All scales use the principle of simultaneous assessment of severity of the patient's condition. In the available literature we did not find an approach that would allow assessing the severity of disease in general. In conducting catamnestic research, and not a prediction of survival, it comes to the fore.

Methods. The retrospective study with total selection was conducted in 136 children aged 8-11 years were treated in neonatal period in NICU of the 1st Children's hospital 1 in St. Petersburg in the second half of 1991 and 1994 irrespectively of diagnosis. All the babies were born in different obstetric clinics in St. Petersburg and then transferred to the NICU in first 0-14 days of life. The gestational age of newborns was distributed in the following way: 28-31 weeks - 16 (11.8%) newborns; 32-34 weeks – 23 (16.9%) newborns; 35-36 weeks – 20 (14.7%) newborns; 37-42 weeks – 77 (56.6%) newborns.

To assess the severity of the illness in the neonatal

period we used NTISS scale (Neonatal Therapeutic Intervention Scoring System, Neonatal Scale invasive therapy, Gray JE et al., 1992) [5,6]. This scale describes the severity of condition based on level of intensity of therapy. Rated on a scale of severity NTISS performed once per day. Depending on the assessment NTISS distinguish 4 classes of severity: 1st class - less than 10 points; 2nd class - 10-19 points; 3rd class - 20-29 points; 4th class - 30 points or more. Since the first day and prior to the transfer of the baby from the NICU for every day of life a total score obtained on a scale NTISS was recorded.

In catamnesis all the children were examined at the age of 8 and 11 years. Anthropometric data, presence of developmental abnormalities, acute and chronic diseases were evaluated on the basis of clinical examination, analysis of medical records and functional tests. Methods of physical examination included: physician examination (assessment of physical characteristics and condition of the functional systems, the presence of malformations); abdomen and kidneys ultrasound, echocardiography, electrocardiogram, spirometry and respiratory function testing and other tests on the testimony; assessment of coagulation parameters; surveyed medical specialists due to the testimony (pulmonologist, allergist, neurologist, cardi-

ologist, hematologist, immunologist, endocrinologist, gastroenterologist, nephrologists).

Results. Under the integrative assessment of the severity of the disease we calculated the total score of the severity for the entire period of the disease.

Iintegrative assessment of the severity of the neonatal disease was obtained as the sum of daily NTISS scores for the entire period the child is NICU. There were summarized all the daily assessments of NTISS severity scale more than 1st class of severity. These summary estimates were obtained for each child.

According to the sum of daily NTISS scores all children were divided into 5 groups: 1st group with total NTISS score of 0-20 points (24 children); 2nd group with total NTISS score of 24-50 points (46 children); 3rd group with total NTISS score of 57-119 points (32 children); 4th group with total NTISS score of 123-247 points (17 children) and 5th group with total NTISS score of 277-630 points (17 children). Thus the severity of the disease estimated in the dynamics for the entire period of observation increases from the 1st to the 5th group. Based on the total NTISS score these groups were called "disease severity groups". Table 1 shows characteristics of each group estimated on the NTISS scale.

Table 1

Characteristics of groups estimated on NTISS scale *

Value	Group				
	1st	2nd	3rd	4th	5th
	n= 24	n= 46	n=32	n=17	n=17
Total daily NTISS scores higher than 1st class of severity	13 (0 – 20)	38 (24 – 50)	89 (57 – 119)	182,5 (123 – 247)	362 (277 - 630)
Total daily NTISS scores higher than 2nd class of severity	0 (0 – 16)	0 (0 – 22)	0 (0 – 46)	21 (0 – 152)	22 (0 – 178)
Total daily NTISS scores higher than 3rd class severity	0	0	0	0	0 (0 – 33)
NTISS score maximum	13 (7 – 20)	15 (12 – 21)	17 (13 – 28)	20,5 (14 – 25)	22,5 (16 – 33)

*median and 5th - 95th percentiles

Affiliation of each child to one of five groups was predicted on the basis of a mathematical model. Efficacy of the model was 78.8 %. Parameters «Total daily NTISS scores higher than 1st class of severity» and «NTISS score maximum» were most informative for the model (> 90%, p < 0.1). For 2nd-5th groups the efficacy of the model was 75%-94%. For the 1st group the efficiency of the model was 46% which was associated with a relatively high maximum score of NTISS scale (invasive procedures, and transportation to a day of life). However in general these children required a short-term (within 1-2 days) treatment in the NICU as evidenced by the low total assessment of the severity of the disease.

The same total score can be folded by relatively low daily evaluations on NTISS scale, but the long-outstanding and high daily count were observed for a shorter time. For example in 4th group duration of including in the 3rd class of severity due to NTISS scale ranged from 0 to 8 days and the total score for this period ranged from 0 to 152 points.

The duration of treatment in the NICU was distributed in the following way (mean and min-max): 1st group – 2 (1-3) days; 2nd group – 5 (3-10) days; 3rd group – 7 (5-12) days; 4th group – 15 (10-37) days; 5th group - 33 (15-47) days.

Distribution of children by disease severity groups was uneven as we expected. The greatest number of

children referred to the 2nd-3rd group was 78 (57.3%). The dependence of the severity of the disease on gestational age was moderate (Spearman correlation coefficient [- 0.5] (p = 0.001). All the groups were heterogeneous by gestational age. This reflects the same severity of disease observed in children with different ages of gestation. But, with the prevalence in the sample full-term infants (56.6 %), the proportion of premature babies from 1st to 4th and 5th groups increases to 3.4 times. It reflects the fact that preterm babies in common had more severe diseases.

Characteristics of the health status of children in catamnesis were obtained from 30 qualitative and quantitative parameters with a focus on the fullest possible description of the health of the child. This feature includes the assessment of physical status, presence of structural abnormalities and functional disorders of organ systems. Malformations of two or more systems were recorded in 88 (64.7%) children, disharmonious physical development was found in 59 (43.4%) of children, 91 (66.9%) children had three or more chronic diseases.

The severity of the disease in the perinatal period was compared with the health of children aged 8-11 years. Table 2 shows the characteristic of parameters of health status, depending on the severity of the former disease in the perinatal period.

Table 2

The health status in 8-11 years, depending on the severity of the disease in the perinatal period

Groups	Value	Valid n=	1st n= 24 abs	%	2nd n= 46 abs	%	3rd n=32 abs	%	4th n=17 abs	%	5th n=17 abs	%	Total n=136 abs	%
Sex	male	136	15	62,2	25	54,3	22	68,8	11	64,7	11	64,7	84	61,8
	female	136	9	37,8	21	45,7	10	31,1	6	35,3	6	35,3	52	38,2
* Physical development	harmonious	126	10	41,7	18	40,9	16	55,2	7	50,0	8	53,3	59	46,8
	disharmonious	126	5	20,8	12	27,3	7	24,1	3	21,4	3	20,0	30	23,8
	extremely disharmonious	126	10	41,7	13	29,5	5	17,2	0	0,0	1	6,7	29	23,0
	causing incorrect	126	0	0,0	1	2,3	0	0,0	3	21,4	4	26,7	8	6,3
Congenital malformations	5 or more small malformations	99	4	22,2	8	20,5	9	40,9	4	50,0	11	91,7	36	36,4
	Cardiovascular system	78	5	33,3	13	43,3	12	57,1	3	60,0	4	57,1	37	47,4
	Respiratory system	126	0	0	0	0	1	3,4	3	21,4	3	18,8	7	5,6
	Musculoskeletal system	117	4	16,7	14	35,0	7	26,9	5	38,5	9	64,3	39	33,3
	Urinary system	90	5	26,3	8	25,0	4	17,4	1	12,5	5	62,5	23	25,6
	Digestive tract	92	9	45,0	24	75,0	14	60,9	2	28,6	6	60	55	59,8
	Nervous system	129	2	8,3	2	4,4	0	0	0	0	2	11,8	6	4,7
	Visual analyzer	124	2	8,3	6	14,6	2	6,9	3	20	6	40	19	15,3
	Auricular analyzer	0	0	0	0	0	0	0	1	5,9	0	0	1	0,7
Chronic diseases and functional disorders	Cardiovascular system	95	11	52,4	21	65,6	12	63,2	9	81,8	9	75	62	65,3
	Pulmonary diseases	122	4	17,4	14	33,3	9	32,1	5	35,7	5	33,3	37	30,3
	Diseases of upper respiratory tract	124	10	41,7	16	37,2	11	39,3	8	57,1	6	40	51	41,1
	Musculoskeletal system	109	16	76,2	31	77,5	23	92	9	81,8	10	83,3	89	81,7
	Urinary system	119	2	8,7	3	7	1	3,8	0	0	1	6,7	7	5,9
	Digestive tract	106	7	31,8	11	29,7	9	36	4	40	7	58,3	38	35,8
	Allergy	121	7	30,4	18	42,9	19	67,9	3	21,4	4	28,6	51	42,1
	Endocrinology	135	4	16,7	5	10,9	4	12,5	0	0	1	5,9	14	10,4
	Frequently ill children	123	4	16,7	7	16,3	7	25,9	4	28,6	4	26,7	26	21,1
	Functional disorders of nervous system	130	15	62,5	29	63	19	67,9	13	86,7	16	94,1	92	70,8
	Organic neurological diseases	129	1	4,2	8	17,8	2	7,1	3	20	9	52,9	23	17,8
	Eye diseases	125	3	12,5	11	25,6	3	10,3	4	26,7	8	57,1	29	23,2
	Hearing loss	123	0	0	0	0	0	0	1	7,1	3	25	4	3,3
	Mental retardation	135	2	8,3	3	6,5	2	6,3	4	25	9	52,9	20	14,8

	N	I		II		III		IV		V		Total	
Children with diseases occurred as the outcome of perinatal problems	129	1	4,2	5	11,1	0	0	2	13,3	12	70,6	20	15,5
Group of health**** I	133	1	4,2	1	2,2	0	0,0	0	0,0	0	0,0	2	1,5
II	133	5	20,8	2	4,3	6	20,0	1	6,3	0	0,0	14	10,5
III	133	14	58,3	34	73,9	15	50,0	10	62,5	6	35,3	79	59,4
IV	133	4	16,7	7	15,2	7	23,3	1	6,3	6	35,3	25	18,8
V	133	0	0,0	2	4,3	2	6,7	4	25,0	5	29,4	13	9,8
Number of systems with structural malformations ***		1 (0 – 4)		2 (0 – 3)		2 (2 – 4)		2 (1 – 4)		3 (1 – 4)		2 (0 – 4)	
The number of systems with chronic diseases and functional disorders ***		2 (0 – 3)		3 (1 – 4)		3 (1 – 4)		2 (1 – 3)		2 (1 – 5)		3 (1 – 4)	
Number of chronic diseases ***		2 (0–6)		3 (1–7)		3 (0 – 7)		4 (1 – 7)		5 (1 – 8)		3 (0,5–7)	

* Physical development is estimated to percentile tables for the children of North-West Russia.

** Acute infectious diseases 4 or more times a year.

*** Median and 5th - 95th percentiles.

**** Group of health - adopted to the Russian classification of the violations of children's health, regardless of age: I - healthy kids; II - healthy kids, with functional and morphological abnormalities that require attention or expert advice; III - children with persistent deviations in health status, confirmed diagnosis of chronic disease, the stage of compensation; IV - children with chronic diseases and congenital defects with periodic functional decompensation; V - children with disabilities.

Developmental abnormalities and chronic diseases are often found in children that had been treated in NICU. Structural malformations of two and more systems were recorded in 88 (64.7%) children, disharmonious physical development was found in 59 (43.4%) of children, 91 (66.9%) children had three or more chronic diseases. There are most commonly observed disorders of the nervous, cardiovascular, musculoskeletal systems and gastrointestinal tract. For most parameters the frequency of irregularities in the sample coincides with the frequency in 2nd-3rd groups that reflects problems of the main group of children which received intensive care.

Briefly describing the health status depending on the severity of the disease in the perinatal period, we noted the following. For a number of parameters characterizing the physical development, the presence of anomalies of development, the formation of chronic diseases and functional disorders, as well as the quantitative characteristics of the health status, level of disability and death rate marked the differences between groups. No one parameter taken separately was found as significant difference between all five groups (Kruskal-Wallis test and Fisher extract p, two-tailed).

Affiliation of a child to one of five groups was predicted on the basis of a mathematical model. Discriminant model included all 30 parameters, characterizing child's health at the age of 8-11 years. Valid number of children was 47. Efficacy of the model was 91.5 % (by groups from 85.7 % to 100%).

Sixteen parameters were most informative for the model (>90%, p<0.1): the presence of structural heart abnormalities, functional disorders of urinary system, structural anomalies of gastrointestinal tract, functional disorders of gastrointestinal tract, hearing impairment, congenital CNS anomalies, mental retardation, endocrinopathy, chronic diseases of upper respiratory tract, belonging to a group of "Frequently ill children", disharmonious physical development, 5 or more small malformations, number of systems with structural abnormalities, number of chronic diseases, number of organ systems with existing chronic diseases, the presence of diseases - outcomes perinatal problems. The remaining parameters are less significant. However exclusion of any parameter even with low partial significance led to follow decreasing of all the model informativeness. This fact indicates the tight relationship of all parameters of health status included in the discriminant model.

The correlations between presence of structural anomalies, severity of former neonatal disease and subsequent formation of chronic diseases can be illustrated as follows (Figure 1):

As can be seen in Figure 1, the presence of structural abnormalities in at least one system is equally common in all groups. As the number of systems with structural abnormalities appears the difference between the groups. The same pattern was observed for the presence of chronic diseases. Thus, the proportion of children with structural anomalies of three or more systems and four or more chronic diseases increases from 1st to 5th group at 4-fold (from 20% to 80%). As well as raising of number of systems with structural anomalies (multiplicity of changes) increases the severity of neonatal disease and number of chronic diseases in follow-up.

Discussion. Thus, answering the question what is the basic regularity observed in the formation of children's health, we can say that the degree of functional
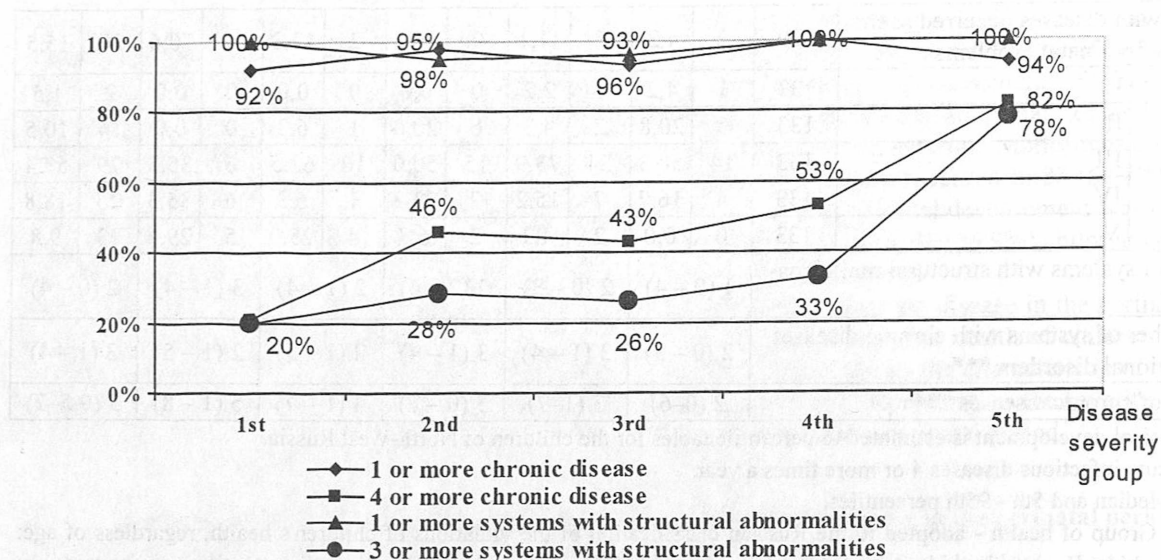
Figure 1. *Structural anomalies and chronic diseases, depending on disease severity group*

disintegration in the neonatal period correlated with the degree of functional disintegration in catamnesis.

As was shown in our study, the severity of the disease is determined by developmental abnormalities of the organism. The severity of the disease increases with the number of structural anomalies. On the other hand, the congenital morphological and functional characteristics determines the state of health throughout life. In turn, the severity of the disease as a measure of functional disintegration determines the timing and severity of violations occurring in the future in functional systems [7].

Thus, the inherent functional and morphological features, illnesses during the perinatal period and the formation of diseases in catamnesis are interrelated processes. Because the severity of neonatal illness can be considered as a "litmus test" token constitutional features of the child and prognostic sign in the subsequent formation of diseases.

Conclusions. Developmental abnormalities and chronic diseases are often found in children that had been treated in NICU in former neonatal period. Tight correlation was revealed between severity of neonatal disease and the health status of children in catamnesis.

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