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FACTORS INFLUENCING THE FORMATION OF CONGENITAL SPINAL HERNIAS COMBINED WITH BRAIN MALFORMATIONS

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Abstract:

Modern neonatology in the last decade is faced with a special problem: congenital anomalies of the spine in newborn children, the main mechanism of which is the absence (more often at the level of the lumbosacral region) of one or more vertebrae, thus forming a defect of bone tissues, with subsequent formation of a spinal canal, then the canal pushes into the void of the formed bone defect, and models a congenital spinal hernia, which experts designate as spina bifida or meningoceles.

Keywords: etiologic factors, clinical and instrumental signs, congenital spinal hernias, children, malformations

INTRODUCTION. Statistical indicators of the prevalence of this pathology vary from 1 to 3 children per 3 thousand healthy newborns, but there is no exact data, so in different countries, the process of developmental anomaly is studied by specialists of different profiles, neonatologists, neurologists, geneticists, neurosurgeons, pediatric surgeons. During the formation of the nervous system (in the first trimester of pregnancy) it is the neural tube that is subjected to pathological process, the cause of which can be multifactorial: these are hereditary mechanisms, mutations or factors of chemical (drugs), biological (viral), environmental factors. In recent years, issues of maternal and child health is a priority state problem, in connection with which is associated with mandatory control of pregnant women in the early stages, taking the drug: folic acid. In general, this has clearly reduced the number of congenital diseases, but the increased risk of infection (with viruses during pregnancy), is considered a major deflector of congenital anomalies . In addition, it should be noted, often in early positions, the woman is unaware of the pregnancy or ignores the need to follow the rules established for the pregnant woman, aimed at eliminating the likely teratogenic factors. Until today, there are several types of congenital spinal hernias (CSH), depending on the internal content. Thus, a common variant - meningocele is filled with cerebrospinal fluid; in Meningoradiculocele - liquor in the aggregate of the spinal cord sheaths; myelomeningocele - filled with liquor, spinal cord sheaths and the spinal cord tissue itself. Myelocystocele, is the most complex in structure, where there is complete prolapse of the spinal cord segment with the sheaths. Rachyschisis, a variant of the most severe condition, spinal splitting, where the spinal cord is visible through a gaping hole in the spinal region, a condition incompatible with life. As you can see, the danger for a small patient lies in the subsequent severe complications of VSH, in the form of infection of the hernia sac, rupture of the hernia sac, progressive compression of the spinal cord. In general, diagnosis is not difficult, at birth is established by a neonatologist with confirmation by a neurologist, but specialized MRI imaging is the gold standard in the study and despite the sufficient coverage of this pathology, a number of aspects of this issue remain unresolved. In particular, the combination of congenital malformations of the brain, somatic pathology (congenital heart disease), and clinical and neurological symptoms depending on etiologic causes remain poorly studied. Consequently, the study of congenital spinal hernias at early stages is relevant and serves as a basis for the present study.

PURPOSE OF THE STUDY: to investigate depending on etiologic factors and to substantiate clinical and instrumental signs of congenital spinal hernias in children in cases of combined malformations.

MATERIAL AND METHODS OF RESEARCH, the material of the study was children aged from birth to 6 months, with congenital spinal hernias, with combined pathology of the brain and heart, this group of children constituted the main group of 19 children for the period 2019-2024. Patients underwent inpatient treatment in

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the MC SamSMU (multidisciplinary clinic of Samarkand State Medical University), on the basis of the department of pediatric neurology, earlier children were examined and treated in the department of pathology of newborns (Children's Hospital of Samarkand State Medical University). The control group consisted of 20 healthy children of identical age and sex. At the first stage, all mothers participating in the use were recommended to undergo a questionnaire, drawn up randomly and approved by the Department of Neurology, with the position to improve, and to show a detailed obstetric history (for the entire period of pregnancy, with a description of control ultrasound procedures), a description of the health of the fathers at the time of conception of the examined children, with the study of the factor of hereditary predisposition, the health of previous children (by number and level of development). At the time of birth, determination and evaluation of the result of labor, Apgar scale indicators, qualitative change followed by correlation of newborn reflexes (depending on the degree of neurological deficit), using the Denver Developmental Screening Test (DDST) scale (1992). All children of the main and control groups underwent analysis of instrumental additional observation, the main methods of which were MRI of the brain and spinal cord, NSG in the dynamics of the examination record, ECHO ECG control, ultrasound of internal organs, analysis of blood and urine biochemistry. It should be noted that all examinations were conducted with the written permission of parents. Statistical processing of the material was carried out on an individual computer, where clinical indicators and indicators of quantitative scales were analyzed by the traditional method according to Spearman's criteria.

THE RESULTS OF THE STUDY, as noted above, the main group of the study consisted of children with combined congenital malformations, where congenital spinal hernia (CSH) was the main criterion for inclusion in the study, the exclusion criterion was the indicators (CSH), but without combined symptoms of congenital pathology, age older than 6 months. In accordance with the objectives, mothers were asked to fill out a questionnaire (if it was not possible, the questionnaire was filled out from the mother's words). Based on the survey data, it is necessary to study the risk factors for the development of VSH, linking them to the nature of the period of pregnancy. Where, the attention was focused on the age features of the mother, bad habits, nature of labor activity, the result of previous pregnancies, concomitant chronic diseases or suffered during pregnancy, complications (somatic-neurological) of the present pregnancy. The result of statistical data revealed that in the control group mothers were aged 21-30 years making up 85%, which corresponds to the correct position for the age of delivery. In the group of newborns with WASH (main), women tended to be older than 35 years of age, representing 70%, where the reliability varied within $p<0.001$. The next features studied in the course of the survey is the comorbid background of diseases, and in the control group women were healthy in 89% of cases, in the main group there were no such women, in each case there was pathology on the side of somatic changes, more often in the aggregate of several problems. Thus, in all women (OG) anemia prevailed 100%, the next in the frequency of occurrence of diseases in mothers of children with WASH found a high percentage of specific bacterial and viral infections (TORCH-infection is the highest indicator, of the composition: cytomegalovirus in first place) 67% of cases. Diseases of the gastrointestinal tract occupied 14% of cases; cardiovascular system problems 11%; endocrine system disorders (in particular hypothyroidism, multinodular goiter) occurred in 43%, it should be noted that two women had type 2 diabetes mellitus; renal failure (chronic pyelonephritis, polycystic kidney disease, urolithiasis) was noted in 8% of cases.

The nature of the course of pregnancy is very important for the formation of a healthy child, accordingly, the indicator of pathological process of the whole term of pregnancy was not ignored. Thus, in the main group of children with CHD, all mothers had toxicosis (at different terms); threat of pregnancy termination was noted in 41% of cases in the first trimester and 33% in the third trimester of pregnancy, with diabetes (gestational) detected only at the end of the third trimester in 9% of cases, and pyelonephritis (gestational) in 15% of cases, where the reliability corresponds to $p < 0, 005$, compared to the control group. The result of control, according to the frequency of pregnancy: in the control group (healthy children) in 56% and in the main group (children with WASH) in 45% of cases - these births occurred in the first labor, where the reliability is equal to $p>0,05$, from which it follows that the frequency of childbirth were not the leading factors in the development of the pathological process. Thus, the main emphasis in the relationship between pregnancy and childbirth should be considered factors, the prevalence of comorbidity of women with chronic somatic, gynecological, infectious pathologies; and cases of a short interval between pregnancies (in some cases the interval is from 9 months to 1 year), as a factor of depletion of the capacity reserve of the body of women. Taking into account the above-mentioned data, the severity and prolongation of perinatal hypoxia naturally increased during pregnancy, so in mothers of children belonging to the control group, caesarean section was used in planned procedure (previously scar on the uterus) in 9% of cases, while in the main group, caesarean section was performed in 37.9% of cases, in planned procedure - in 16.3%, where the reliability $p<0.005$. In the main group, the predisposing factors were the indicators presented in the table (Table 1).

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Table 1
Risk factors detected in mothers, whose children were born with a combined lesion of WHS

№	Risk factors	Main group	Control group
1	Specific bacterial and viral infection (TORCH infection - cetomegalovirus, chlamydia, gernea, toxoplasmosis, etc.)	100	0
2	Chronic somatic diseases of the mother (more than 2)	100	23
	Tonsillitis	2	50
	Acute bronchitis	1	33
	Pneumonia	2	19
3	Acute inflammatory diseases during pregnancy (Covid, acute respiratory viral infections, influenza)	44	10
4	Non-developing pregnancy, spontaneous miscarriage (history)	60	8
	Medical abortion	1	13
	Uterine myoma	1	27
	Ectopic pregnancies	0	8
5	History of infectious gynecologic pathology	0	29
6	Stillbirth (history)	30	0
	Birth of a premature baby	1	65
7	Aggravated obstetric and gynecological history (gestosis, toxicosis)	57	4
	Multivaginal hemorrhage	1	39
	Low water supply	1	21
	Threat of miscarriage	2	95
	Preeclampsia	0	43
	Toxicosis during pregnancy	4	20
8	Gestational diabetes	27	3
	Gestational pyelonephritis	0	37

As can be seen from the table, the factors of predisposition were in the limiting figures from 0.010 to 0.500. Correlation values, as it is known, according to the coefficient, has >0.25, which allow us to talk about the relative correlation between the traits. Using these values, the indicators had values on factors, from 0,010 to 0,135 - low; from 0,140 to 0, 300 - moderate; from 0,300 to 0,500 - high value. Established for the period of the study, significant factors, influences on the pathological process, chronic somatic diseases during pregnancy - 0, 400; histoses (toxicosis) - 0.480; acute inflammatory diseases (Covid 19, influenza, hepatitis) during pregnancy - 0.500; TORCH infection (cytamegalovirus, chlamydia, herpes virus) - 0.500; not following the rules of nutrition and disease prevention during pregnancy (fasting, not using such drugs as folic acid, iodomarin, vitamins-microelements) - 0.500 (tab. 2)

Table 2
Result of correlation analysis of maternal health risk factor during pregnancy and outcome of newborns with WASH

№	Risk factors	χ2 with Yates correction	Fisher's exact criterion (two-sided)	Minimum value of the expected phenomenon	Level of value Δ
1	Specific bacterial and viral infection (TORCH infection - cetomegalovirus, chlamydia, gernea, toxoplasmosis, etc.)	3,000 0,005	NaN p>0,05	16,37	0,500
2	Chronic somatic diseases of the mother (more than 2)	*31,4* *<0,001*	*NaN* *p>0,05*	*18,3*	*0,400* *средняя*
	Tonsillitis	0,966 0,161	NaN p>0,05	5,27	0,096 несущ
	Acute bronchitis	1,382 0,240	NaN p>0,05	3,45	0,086 несущ
	Pneumonia	0,078 0,781	NaN p>0,05	2,13	0,006 несущ
3	Acute inflammatory diseases during	*70,4*	*NaN*	*19,09*	*0,500*

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	pregnancy (Covid, acute respiratory viral infections, influenza)	*<0,001*	*p>0,05*		
4	Non-developing pregnancy, spontaneous miscarriage (history)	*10,9*	*NaN p>0,05*	*19,02*	*0,300*
	Medical abortion	0,005 0,942	NaN p>0,05	1,42	0,022 несущ
	Uterine myoma	0,755 0,379	NaN p>0,05	2,84	0,070 несущ
	Ectopic pregnancies	0,136 0,713	NaN p>0,05	0,81	0,056 несущ
5	Infectious gynecologic pathology (history)	33,3 0,05	NaN p>0,05	13,9	0,330
6	Stillbirth (history)	10,5 0,005	NaN p>0,05	12,3	0,369
	Birth of a premature baby	*5,765 0,017*	*NaN p>0,05*	*6,69*	*0,153 слабая*
7	Aggravated obstetric and gynecologic anamnesis (gestosis, toxicosis)	*21,9 0,005*	*NaN p>0,05*	*18,9*	*0,400*
	Multivaginal hemorrhage	2,070 0,151	NaN p>0,05	4,05	0,100 слабая
	Low water supply	0,287 0,593	NaN p>0,05	2,23	0,052 несущ
	Threat of miscarriage	*11,190 <0,001*	*NaN p>0,05*	*10,84*	*0,206 средняя*
	Preeclampsia	4,447 0,035	NaN p>0,05	4,36	0,138 слабая
	Toxicosis during pregnancy	*50,691 <0,001*	*NaN p>0,05*	*8,72*	*0,426 отн сильная*
8	Gestational diabetes	20,49 0,005	NaN p>0,05	13,43	0,300 несущ
	Gestational pyelonephritis	3,582 0,059	NaN p>0,05	3,75	0,127 слабая

An important component of the control of the level of adaptation of newborns is the Apgar scale, so the result of the analysis of children of the main group at the first minute on the scale 60% confirmed scores within 3, maximum, at 4-5 points revealed the remaining children 37% and in 3% of cases is noted 6 points, where the reliability compared to healthy children has $p<0.001$.

Hernia sizes were characteristic from the moment of birth of the child. In 30%, the surface of the VSH had special areas of skin pattern, in the form of thinning of the skin (33% of cases) or pigment (brown in 70%), or the appearance of maceration and ulceration. On the side of clinical and neurological symptoms, disorders of motor and pelvic dysfunction (paresis of the lower limbs, incontinence or urinary retention), paraparesis inferior (flaccid) occurred in 52%), in one case there was spasticity of the legs inferior paraparesis.

In two cases in the main group, congenital spinal hernia was accompanied by pathology of the spine and spinal cord in the form of spinal cord hypoplasia detected on MRI. One newborn had diastematomyelia combined with meningocele (MRI analysis). Neuroimaging of the brain revealed changes in the brain in the form of the following symptoms, such as hydrocephalus (59%), arachnoid cyst (21%), and in the remaining cases, hypoplasia of the corpus callosum or hypoplasia of the cerebellum. In addition, it was noted that hydrocephalus syndrome was most often combined with VSH in the form of meningoradiculocele - in 52% of cases (of all combinations with hydrocephalus).

In addition, signs in the form of pyramidal dysfunction, rapid disappearance of tendon reflexes from the legs; sensory damage in the form of hyposthesia (children did not respond to the prick in the area of the legs, 65% of cases. On the side of hMN oculomotor disorders strabismus (17%), Grefe's symptom (38%). Bulbar symptomatology was found in 3 patients; signs of respiratory disturbance (bradypneic) were frequent.

In accordance with the goal, the study was to investigate the combined pathologic processes in children with VSH, in this case we present a clinical case, for a more complete clinical picture of the disease.

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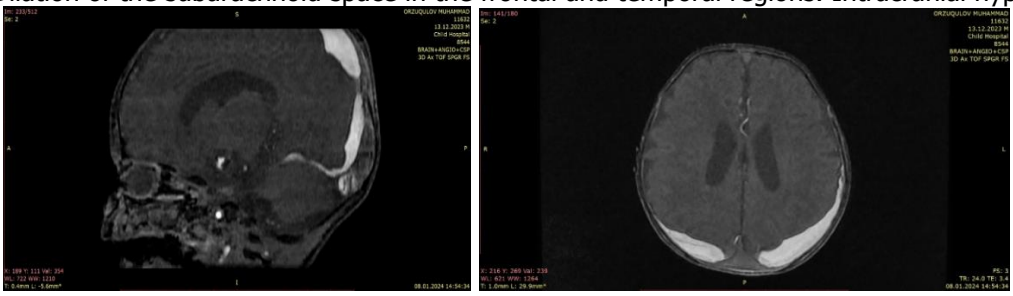
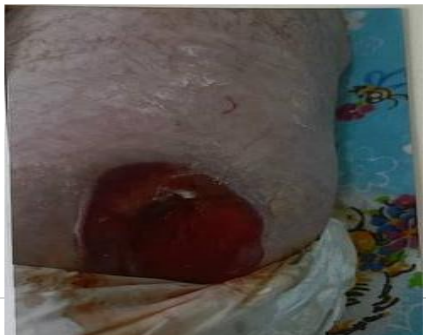
Clinical case. The newborn patient, (N), was born from the second pregnancy, second delivery; the first pregnancy ended in premature delivery (the child was born with a severe heart defect, died within a week after delivery); Marriage of the parents is not related, the mother's age is 35 years, has no bad habits, lives in the city; after the first unsuccessful pregnancy, she was examined at the screening center and the Mother-Child Center (Tashkent), the data on the screening center and the Mother-Child Center (Tashkent). Tashkent), the data on TORCH infection (a combination of cytomegalovirus, herpes, chlamydia and toxoplasmosis), within six months she was treated (the tests were not repeated), the second pregnancy occurred; during the second pregnancy blood tests confirmed the presence of the same viruses, the mother refused artificial termination of pregnancy. On the father's side (according to his wife, his health was good, he has no bad habits), the father himself refused to be interviewed. Labor occurred at 38 -39 weeks, the woman was admitted with high blood pressure (145/100), tachycardia, subfebrile temperature, edema. Direct indication for cesarean section, the baby was born at 3 on the Apgar scale, the cry was very weak, not immediately, after resuscitative measures. At birth, a congenital spinal hernia (with abundant hair loss in this area) was detected at the level of the lumbosacral region. On the second day, the child showed signs of agitation, susceptibility to seizures, mild rigidity (decerebration regidity type); vomiting, on the second day; the child "moaned", marble skin pattern. On the recommendation of a neurologist, an MRI study of the brain, thoracic region, lumbosacral region; cardiac sonography was performed. (Fig.1)

Figure 1: Dilation of the subarachnoid space in the frontal and temporal regions. Intracranial hypertension.





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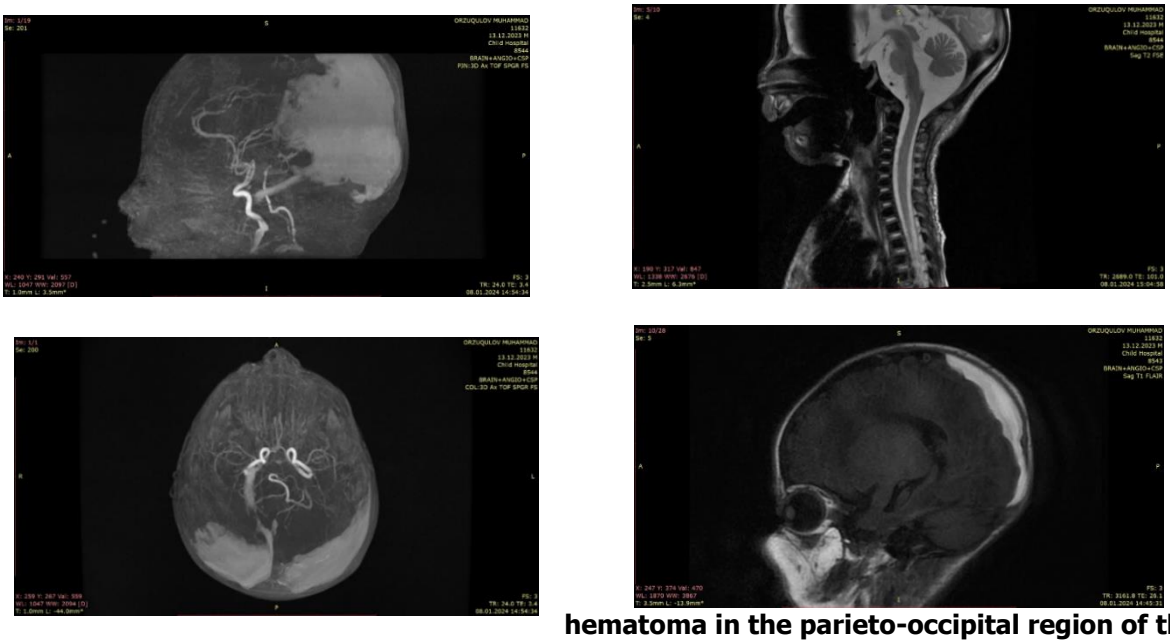

MRI signs of hematoma in the parieto-occipital region of the brain on both sides. Megacisterna magna - developmental variant. Expansion of the subarachnoid space in the frontal and temporal regions. Intracranial hypertension.

Figure 2:

CONCLUSIONS: Thus, the most frequent combined malformations of congenital spinal hernia in newborns are disorders of the brain, in the form of hydrocephalus, hypoplasia of the corpus callosum or cerebellum, in addition, VSH is accompanied by changes in the spinal cord in the form of hypoplasia of the spinal cord. The most frequent, aggravating the background of the underlying disease, are heart disorders, in the form of malformations and respiratory failure, which leads to fatal outcomes of such patients. The main risk factors for the development of congenital malformations in combination of spinal hernias, malformations of the brain and spinal cord, cardiac and pulmonary pathology, is the presence of specific bacterio-viral infections in the mothers during pregnancy, chronic somatic pathologies, infectious and gynecological pathologies, failure to follow the rules of a healthy lifestyle during pregnancy.

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