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НОВЫЙ ДЕНЬ В МЕДИЦИНЕ

NEW DAY IN MEDICINE

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CRITERIA OF CARDIOVASCULAR DISORDERS IN NEPHRITIC SYNDROME IN CHILDREN

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✓ ***Resume***

Objective to establish the criteria for renocardial syndrome in nephritic syndrome in children. Material and methods: 105 children hospitalized with nephritic syndrome in the nephrology department of the Samarkand Regional Children's Multidisciplinary Medical Center were examined.

Results: Renocardial syndrome in nephritic syndrome develops in 64.8% of cases, most of the patients are children 3-6 years of age (44.1%) with a predominance of boys (58.8%). Cardiometric study in patients with nephritic syndrome. Renocardial syndrome is manifested by significant changes in metabolic and adaptive parameters: oxygen and lactate content - by 1.5 times, creatine phosphate - by 20%, tension index - by 4.8 times and vascular stiffness index - by 5.2 times.

Conclusion: The deviation of cardiometry parameters in different age groups indicates a decrease in the intensity of blood circulation in organs and systems, indicating a significant load on the cardiovascular system in nephritic syndrome

Keywords: nephritic syndrome, children, cardiometry, metabolism, cardiorenal syndrome

NEFRIT SINDROM BILAN KASALLANGAN BOLALARDA YURAK-QON TOMIR BUZILISHLARINING MEZONLARI

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✓ ***Rezyume***

Maqsad: bolalarda nefritik sindromda renokardial sindromning mezonlarini aniqlash. Material va uslublar: Samarqand viloyat bolalar ko‘p tarmoqli tibbiyot markazi nefrologiya bo‘limiga o‘tkir nefritik sindrom bilan yotqizilgan 105 nafar bola ko‘rikdan o‘tkazildi.

Natijalar: O'tkir nefritik sindromda renokardial sindrom 64,8% hollarda rivojlanadi, bemorlarning ko'p qismini 3-6 yoshli bolalar (44,1%), o'g'il bolalar (58,8%) ustunlik qiladi. Nefritik sindromi bo'lgan bemorlarda o'tkazilgan kardiometrik tadqiqotda renokardial sindrom metabolik va moslashuv parametrlarida sezilarli o'zgarishlar bilan namoyon bo'ladi: kislorod va laktat miqdori - 1,5 baravar, kreatin fosfat - 20%, kuchlanish indeksi - 4,8 baravar va qon tomir indekslari. - 5,2 baravarga.

Xulosa: Turli yosh guruhlarida kardiometriya ko'rsatkichlarining og'ishi organlar va tizimlarning qon aylanishining intensivligining pasayishini ko'rsatadi, bu nefritik sindromda yurak-qon tomir tizimiga sezilarli yukni ko'rsatadi

Kalit so'zlar: nefritik sindrom, bolalar, kardiometriya, metabolizm, kardinal sindrom

КРИТЕРИИ СЕРДЕЧНО-СОСУДИСТЫХ НАРУШЕНИЙ ПРИ НЕФРИТИЧЕСКОМ СИНДРОМЕ У ДЕТЕЙ

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✓ ***Резюме***

Цель: установить критерии ренокардиального синдрома при нефритическом синдроме у детей.

Материал и методы: Обследованы 105 детей, госпитализированных с нефритическим синдромом в нефрологическое отделение Самаркандского областного детского многопрофильного медицинского центра.

Результаты: Ренокардиальный синдром при нефритическом синдроме развивается в 64,8% случаев, большую часть пациентов составляют дети 3-6 лет жизни (44,1%) с преобладанием мальчиков (58,8%). При кардиометрическом исследовании у больных с нефритическим синдромом, ренокардиальный синдром проявляется достоверными изменениями метаболических и адаптационных параметров: содержания кислорода и лактата – в 1,5 раза, креатинфосфата – на 20%, индекса напряженности – в 4,8 раза и индекса жесткости сосудов – в 5,2 раза.

Заключение: Отклонение показателей кардиометрии в разных возрастных группах свидетельствует о снижении интенсивности кровообращения органов и систем, указывая о значительной нагрузке на сердечно-сосудистую систему при нефритическом синдроме

Ключевые слова: нефритический синдром, дети, кардиометрия, метаболизм, кардинальный синдром

Relevance

Introduction. Cardiorenal syndrome (CRS) is a condition in which the function of the heart and kidneys is impaired, mutually influencing each other [1,2,3,4]. This is a complex disease that can occur due to both heart problems and kidney problems. Cardiorenal syndrome can be divided into five types depending on the underlying cause and mechanism of development: type 3 Renocardial syndrome, in which kidney injury causes dysfunction of the heart [5,6,7]. This syndrome can be manifested by various symptoms, including edema, deterioration of kidney function, shortness of breath, fatigue, decreased appetite and increased blood pressure [8,9]. To date, an objective assessment of the diagnostic information content of the cardiometric method in the detection of cardiovascular disorders in renal pathology in children has been given [10-15]. Based on the results of clinical and functional indicators of the proposed tactics, the need for early diagnosis of nephritic syndrome with cardiorenal syndrome was indicated. This is necessary for the early detection and treatment of cardiorenal syndrome, to prevent the progression of the disease and improve the prognosis for patients.

Thus, we proposed a new effective and optimal set of research methods allows us to give an objective assessment of the severity of disorders of the cardiovascular system in nephritic syndrome in children.

Materials and methods

We examined 105 patients with nephritic syndrome aged 3 to 18 years who were hospitalized in the nephrology department of the Samarkand Regional Children's Multidisciplinary Medical Center. To evaluate the effectiveness of various methods for diagnosing renocardial syndrome in nephritic syndrome, monitoring the presence or absence of changes in the work of the heart, all patients were divided into 2 groups: the main (MG), which included 68 (64.8%) patients with cardiorenal syndrome, and the control (CG), which included 37 (35.2%) patients without signs of damage to the cardiovascular system. The normative indicators of the research methods used were determined in a group of practically healthy children of the same age and sex composition. Among them, 15 (37.5%) children were aged from 3 to 6 years old, 13 (32.5%) were from 7 to 12 years old and 12 (30.0%) were aged 13-18 years old, including - 22 (55.0%) boys and 18 (45.0%) girls.

The distribution of patients in age groups according to WHO recommendations is shown in Table 1.

Table 1 shows that among the patients, a larger number - 46 (43.8%), were children aged 3–6 years. In the control and main groups, there were 30 (44.1%) and 16 (43.3%), respectively. There were 11 (29.7%) patients with nephritic syndrome aged 7–12 years in the control group, 20 (29.4%) in the main group. nephritic syndrome most often occurs in preschool children (about 45% of patients). It is also worth noting that the age composition of patients in the groups was equivalent.

Table 1

Distribution of patients by age and groups (n=105)

Age, years	Main group	Control group	Total
3-6	30 (44,1%)	16 (43,3%)	46 (43,8%)
7- 12	20 (29,4%)	11 (29,7%)	31 (29,5%)
13-18	18 (26,5%)	10 (27,0%)	28 (26,7%)
Total	**68 (100%)**	**37 (100%)**	**105 (100%)**

To make a full diagnosis, assess the functional state of the cardiovascular system, a comprehensive examination of patients was carried out, including a clinical examination, measurement of anthropometric data, laboratory and instrumental methods of research. To assess the physiological state of the cardiovascular system, using cardiometry, metabolic indicators of the work of the heart muscle and systemic parameters of regulation are determined: the level of oxygen (O2), the level of lactate (lactic acid) and the level of creatine phosphate in the myocardial muscles (CrF), as well as the cardiac index - the ratio minute volume of blood circulation to body surface area, heart rate variability index, tension index according to R.M. Baevsky, which reflects the total effect of cardiac regulation, the vascular stiffness index is an indicator of vascular elasticity, the risk index is the risk of developing cardiovascular diseases and complications [16,17]. (picture 1).

Figure 1 Screenshot of the interface of the program "Cardiocode" of one of the patients

As you can see in Figure 1, one field contains all the necessary information. All parameters are calculated automatically. Blood volumes are a function of the duration of the phases of the ECG cardiac cycle. Their measurement and formulation in the hemodynamic equations of G. Poedintsev - O. Voronov allow obtaining the above blood volumes.

During the study, guardians and parents of the subjects under study gave their informed consent to the processing of personal data.

Mathematical data processing was carried out on an HP personal computer using the Microsoft Excel program. When analyzing the results obtained, the mean values (M), standard deviation, median, percentages and shares were determined. The significance of differences was assessed using Student's t-test. Differences were considered significant at $p<0.05$.

Results and discussions

Table 2 shows the main complaints made by patients with nephritic syndrome. All patients complained of changes in the color and amount of urine, weakness and fatigue. Most of the children noted lack of appetite and edema in the limbs and trunk - 105 (100%) and 82 (78.1%) patients, respectively. Other complaints were met in smaller numbers, but they should be taken into account for a more objective assessment of the patient's condition. The dependence of the number of complaints on the clinical variation of the course of the disease is checked. So, shortness of breath with minor physical

exertion, chest pain, palpitations occur in children in 21.9% of cases. It is these complaints that can be manifestations of the renocardial syndrome.

Table 2

Characteristics of complaints in children with nephritic syndrome (n=105)

№	Complaints	nephritic syndrome
1	Dizziness, headaches	38 (36,2%)
2	Weakness, fatigue	105 (100%)
3	Shortness of breath with minor physical exertion	23 (21,9%)
4	Lower back pain	40 (38,1%)
5	Chest pain	23 (21,9%)
6	Feeling the heartbeat	23 (21,9%)
7	poor appetite	105 (100%)
8	Urine color change	105 (100%)
9	Increase in body temperature	45 (42,9%)
10	Decreased amount of urine	80 (76,2%)
11	Edema	82 (78,1%)

An extremely topical issue in pediatrics is chronisation into a nephritic form, which can lead to a decrease in kidney functionality and the development of chronic kidney disease. In this regard, knowledge of the clinic and options for the course of the disease is very important. Symptoms of nephritic syndrome appear after a provoking factor, most often a primary infection. The disease is characterized by an onset, proceeds quickly, with vivid symptoms, of which the most common are shown in Table 3.

Table 3

Clinical signs of nephritic syndrome in children (n=105)

№	Clinical symptoms	nepritic sydrome
1	arterial hypertension	33 (31,4%)
2	tachycardia	18 (17,1%)
3	bradycardia	7 (6,7%)
4	systolic murmur	30 (28,6%)
5	extrasystole	3 (2,9%)
6	pulmonary edema	3 (2,9%)
7	hydrothorax	7 (6,7%)
8	Ascites	13 (12,4%)
9	hydropericardium	3 (2,9%)
10	Anasarka	3 (2,9%)

As shown in Table 3 in a detailed study of the cardiovascular system, 31.4% of children have arterial hypertension, 17.1% tachycardia, 28.6% systolic murmur, 12.4% ascites. When combining the obtained data, it was revealed that the nephritic syndrome was characterized by a tetrad of symptoms: hematuria (100%), edema (78.1%), oliguria (76.2%) and dyspeptic disorders (76.2%). Symptoms characteristic of the development of cardiorenal syndrome: tachycardia - in 7.1%, bradycardia - 6.7%, systolic murmur - 28.6% and extrasystole - 2.9%.

Table 4 shows the data reflecting the dependence of metabolic parameters of cardiometry on the age of patients with nephritic syndrome, the values of glomerular filtration rate and biochemical renal blood parameters in them.

Note: * - significant differences compared to the norm at the corresponding age ($p<0.05$); ** - significant differences compared to 7-12 years old at the corresponding age ($p<0.05$); *** - significant differences compared to 13-18 years old at the corresponding age ($p<0.05$);

Table 4

Metabolic cardiometry data depending on the age of patients and the degree of renal dysfunction (n=105)

Options	Age, years			Standart (n=40)
	3-6 (n=46)	7-12 (n=31)	13-18 (n=28)	
GFR, ml/min/1.73m^2	26,8±1,8*	30,3±2,7*	31,8±1,9*	95,4±8,12
Creatinine, µmol/l	300,8±19,2*,**,***	246,1±16,1*	213±13,2*	91,8±3,5
Urea, mmol/l	11,8±1,6*	13,7±1,4*	15,1±2,8*	4,1±0,4
Oxygen, U.E	0,36±0,02*,***	0,41±0,02*	0,44±0,02*	0,55±0,02
Lactate, U.E.	5,8±0,18*,***	5,4±0,11*,***	4,8±0,15*	3,6±0,11
Creatine Phosphate, U.E.	1,85±0,07*	1,98±0,07*	2,03±0,08	2,2±0,05

All indicators in Table 4 differ from the normative values in all age groups. It should be noted that the higher the values of creatinine and urea, as well as the lower the level of glomerular filtration rate in patients with nephritic syndrome, the more pronounced deviations in the amount of oxygen, lactate and creatine phosphate during cardiometry. So, in patients aged 3-6 years with GFR 26.8±1.8 ml/min/1.73m2, creatinine 300.8±19.2 µmol/l and urea 11.8±1.6 mmol/l, the oxygen level, lactate and creatine phosphate amounted to 0.36±0.02, 5.8±0.18 and 1.85±0.07 E.U., which has significant deviations from these indicators in practically healthy children.

In children with kidney pathology, the efficiency of aerobic processes decreases compared to the norm, and the body switches to an anaerobic process of the heart muscle, accompanied by the accumulation of lactic acid.

Table 5

Adaptive capacity of the heart in patients with nephritic syndrome in different age groups (n=105)

Options	Age, years			Standart (n=40)
	3-6 (n=46)	7-12 (n=31)	13-18 (n=28)	
Tension index	297,8±22,2*	267,5±19,5*	264,6±23,5*	62,5±7,9
Cardiac index l/min/m2	1,98±0,16*	2,03±0,15*	2,08±0,25	2,4±0,11
Vessel stiffness index, mmHg/ml.	6,24±0,75*	6,86±0,88*	6,61±0,94*	1,2±0,09
Risk index c.u.	0,18±0,039*	0,18±0,035*	0,19±0,027*	0,05±0,008

The study of adaptive parameters of cardiometry in patients with nephritic syndrome showed that the tension index was in the range from 264.6±23.5 to 297.8±22.2, which is significantly higher than the norm (62.5±7.9) ($p< 0.05$) (Table 5). Increased index of vascular stiffness, which in children of different ages with nephritic syndrome averaged from 6.24±0.75 to 6.86±0.88 mmHg/ml, indicating a decrease in vascular elasticity. In turn, the cardiac index was at the level of 1.98±0.16 - 2.08±0.25 l/min/m2, and was significantly below the norm ($p<0.05$) in children aged 3-6 and 7-12 years, which indicates a decrease in the intensity of blood circulation of organs and systems in this category of patients. All these indicators indicate a significant load on the cardiovascular system in nephritic syndrome.

Conclusion

The deviation of cardiometry parameters in different age groups indicates a decrease in the intensity of blood circulation in organs and systems, indicating a significant load on the cardiovascular system in nephritic syndrome.

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