Section 2. Medical science

https://doi.org/10.29013/ESR-21-1.2-11-16

Akhmedzhanova Nargiza Ismailovna,
Doctor of Medical Sciences, Associate Professor,
Head of the Department of 2-Pediatrics
of the Pediatric Faculty of SamMI
Samarkand State Medical Institute

Akhmedzhanov Ismail Akhmedzhanovich,
Doctor of Medical Sciences, Professor,
Head of the Department of Pediatric Surgery № 2
of the Pediatric Faculty of SamMI,
Samarkand State Medical Institute

Ashurova Noilya Shukhratovna,
doctoral student of the Department 2
Pediatrics of the Pediatric Faculty of SamMI
Samarkand State Medical Institute

MODERN METHODS OF TREATMENT OF ANEMIC SYNDROME IN CHRONIC PYELONEPHRITIS IN CHILDREN

Abstract. Regardless of the etiology, any chronic kidney disease comes to the final histological point – the "last stage kidney" – non-functioning, sclerosed glomeruli, atrophied tubules, interstitial fibrosis. Purpose of the work: to assess the effect of anemia on the course of chronic pyelonephritis in children and the effectiveness of the drug "Askozhel". All children are divided into two groups: group 1 – chronic primary pyelonephritis, group 2 – chronic secondary non-obstructive pyelonephritis. To assess the effect of anemia on the pathological process in the kidneys, both groups were divided into subgroups: subgroup 1 – children with mild anemia (hemoglobin level <90 g/l), subgroup 2 – children with moderate anemia (hemoglobin level 89–70 g/l). Results and discussion. The effectiveness of the inclusion of the drug "Askozhel" in patients with various forms of CP, was expressed not only in the positive dynamics of clinical symptoms, but also in the improvement of the studied parameters of the body's blood, had significant advantages over the traditional method of treatment in the most significant parameters. Conclusions. The use of the drug "Askozhel" in CP is the most acceptable method of therapy.

Keywords: nephrogenic anemia, endogenous creatinine clearance, chronic pyelonephritis, "Askozhel".

Regardless of the etiology, any chronic kidney disease comes to the final histological point – the "last stage kidney" – non-functioning, sclerosed glomeruli, atrophied tubules, fibrosis of the interstitium [1; 2; 3]. In this case, the steady progression of the pathological process is the result of the emergence of a self-sustaining vicious circle of fibrosis, which was triggered by the action of the first damaging factor [4].

Interstitial damage leads to increased pressure in the capillaries of the glomeruli and / or to an increase in blood volume in the capillaries, which leads to hypertrophy of the glomeruli, damage to podocytes and overproduction of the extracellular matrix. Interstitial fibrosis induces tubular ruptures, which lead to tubular destruction and the formation of nonfunctioning "atubular" glomeruli [5].

In addition, interstitial fibrosis leads to a decrease in the number of peritubular capillaries, which also contributes to the destruction of the tubules. It has been proven that even after primary sclerosis, the pathological process in damaged glomeruli does not stop – pathological cell transformation continues in them [6; 7].

Even more important, the issues of therapy of early stages of chronic renal failure acquire in the light of the possibility of regression of the process. Although the terminal stage of chronic renal failure is irreversible, there is a possibility of regression of the pathological process in the kidneys. This theory is supported by the data of studies of experimental models of kidney damage in animals [8; 9].

Purpose of the work: to assess the effect of anemia on the course of chronic pyelonephritis in children and the effectiveness of the drug "Askozhel".

Materials and methods of research. Among the patients observed in the Samarkand region in the regional multidisciplinary scientific center (chief physician – M. K. Azizov), for the period from 2019 to 2020, 57 children with an established diagnosis of CP were selected. the drug in the complex treatment of CP, the patients were divided into 2 groups. The first group consisted of 27 patients with CP (10 of them with ChPP and 17 with ChSNObP) receiving traditional therapy. The second group consisted of 30 children (including 10 children with ChPP and 20 patients with ChSNObP) who received the drug "Askozhel" against the background of traditional treatment.

An objective examination in all patients revealed the well-known general and renal symptoms of the disease, characteristic of each form of the disease, the dynamics of which, depending on the methods of treatment, is presented in table 1.

Table 1.– The dynamics of the elimination of clinical symptoms in children with ChPP and ChSNObP on the background of the use of the drug "Askozhel" (in days, M + m)

Symptoms	**Conventional therapy**		**Patients who received «Askozhel»**	
	with ChPP (n=10)	**with ChSNObP (n=17)**	**with ChPP (n=10)**	**ChSNObP (n=20)**
1	***2***	***3***	***4***	***5***
1. Common symptoms				
General state	8.1±0.2	9.1±0.23	5.2±0.28 P<0.001	6.1±0.15 P<0.001
Body temperature	4.2±0.24	5.2±0.14	2.3±0.31 P<0.001	3.4± 0.42 P<0.001
Pallor of the skin and mucous membranes	9.18±0.34	10.1±0.52	6.2±0.33 P<0.001	7.1±0.46 P<0.001

1	*2*	*3*	*4*	*5*
Nausea and vomiting	7.0±0.21	8.2±0.42	5.2±0.45 P<0.02	6.2±0.55 P<0.05
Weakness	9.1±0.58	10.3±0.64	6.3±0.62 P<0.05	7.2±0.35 P<0.001
Improved appetite	8.15±0.41	9.2±0.48	5.3±0.46 P<0.001	6.3±0.62 P<0.001
2. Renal symptoms				
Pain and discomfort in the lumbar region	8.2±0.71	9.2±0.41	5.13±0.42 P<0.001	6.2±0.57 P<0.001
Dysuric phenomena	8.1±0.33	9.3±0.48	5.2±0.74 P<0.02	6.3±0.36 P<0.001
Sanitation of urine	9.3±0.33	10.1±0.43	6.3±0.31 P<0.001	7.2±0.44 P<0.001
«+» Symptom of Pasternatsky's tingling	8.2±0.73	9.2±0.45	5.1±0.62 P<0.05	6.3±0.41 P<0.001
Average hospital stay	15.1±0.58	16.2±0.55	12.2±0.6 P<0.001	13.2±0.7 P<0.05

Note: P-certainty versus conventional therapy

As can be seen from the table, under the influence of the drug "Askozhel" in patients with ChPP, along with an improvement in the general condition by 5.2 ± 0.28 (P <0.001) day, a decrease in the pallor of the skin by 6.2 ± 0.33 (P < 0.001) day after the start of treatment, which is 2 times faster in comparison with the traditional group: by 8.1 ± 0.2, by 4.2 ± 0.24, by 9.18 ± 0.34 days, respectively. In case of chronic renal failure, ferrotherapy with the drug "Askozhel" for 5–6 days contributed to a significant acceleration of the normalization of some renal signs of the disease: pain and discomfort in the lumbar region by 5.13 ± 0.42 (P <0.001), dysuric phenomena by 5, 2 ± 0.74 (P <0.02) days from the start of treatment in comparison with the control group: by 8.2 ± 0.71, 8.1 ± 0.33 days, respectively.

Consequently, "Askozhel" in the treatment of chronic renal failure in children, along with an improvement in the dynamics of general symptoms, also effectively affects the renal signs of the disease, which in general leads to a reduction in the treatment time of patients to 12.2 ± 0.6 (P <0.001) days.

It should be noted that in ChSNObP, as in the case of a comparative analysis conducted in patients with chronic renal failure, the drug "Askozhel" was more effective in all symptoms of the disease.

A comparative analysis of the dynamics of the clinical picture (table 1) testifies to the undoubted advantage of this drug, in terms of the elimination of both general and renal symptoms of the disease, and at the same time having advantages in some analyzed clinical parameters.

Comparative evaluation of laboratory studies carried out after treatment in children with CP, depending on the method of treatment, revealed various changes in iron parameters (tables 2, 3). Iron is an essential trace element, the main component of the synthesis of hemoglobin and myoglobin, maintains the prooxidant-antioxidant balance, catalyzes the processes of electron transport, is part of more than 100 enzymes, ensuring the vital activity of all cells in the body. In this regard, it is quite obvious that Fe deficiency can play an important role in the high susceptibility of children to inflammatory diseases.

Serum ferritin is the main Fe depot in the body, therefore it is considered the main marker of the Fe reserve fund. Most of the ferritin is concentrated in cells in the liver, spleen, and bone marrow, from where Fe can be mobilized and distributed through plasma transferrin depending on the body's needs. The small amount of ferritin found in circulation is in direct correlation with total body Fe stores and can be detected in serum. A serum ferritin level <12 μg/L reflects the depletion of the tissue depot of Fe and indicates iron deficiency, and in combination with hematological criteria for anemia, confirms the presence of IDA.

Table 2.– Dynamics of iron indices in patients with chronic renal failure, depending on the method of treatment (M ± m)

Indicators	Healthy	Patients with chronic primary pyelonephritis		
		before treatment (n=57)	after treatment	
			I group (n=10)	II group (n=17)
Hemoglobin, g/l	115.14±2.94	98.4 ± 7.1 г/л	99.7±1.70 P_1>0.1	108.9±2.79 P_1<0.01. P_2<0.05
Serum iron, μmol/l	14.6 ± 7.3	10.8 ± 6.3	12.37±0.02 P_1>0.1	13.9±0.1 P_1<0.02
Ferritin, mcg/l	238.2 ± 206.5	202.5 ± 199.2	210.4±1.13 P_1>0.1	225.7±190.3 P_1<0.01. P_2<0.001
Transferrin, mg/dl	215.5 ± 49.1	188.2 ± 37.5	192.6±28.2 P_1>0.1	200.9±32.6 P_1<0.01

Note: P – significance of the difference between the parameters of healthy people and in children with chronic pyelonephritis. P_1 – significance of the difference between the parameters before and after treatment. P_2 – reliability of the difference between the traditional and the group of children who received the drug "Askozhel"

Table 3.– Dynamics of iron indices in patients with ChSNObP, depending on the method of treatment (M ± m)

Indicators	Healthy	Patients with chronic secondary non-obstructive pyelonephritis		
		before treatment (n=57)	after treatment	
			I group (n=10)	II group (n=20)
Hemoglobin, g/l	115.14±2.94	98.4 ± 7.1	99.1±1.77 P_1>0.1	105.5±2.04 P_1<0.01. P_2<0.01
Serum iron, μmol/l	14.6 ± 7.3	10.8 ± 6.3	11.97±0.02 P_1>0.1	13.1±0.5 P_1<0.02
Ferritin, mcg/l	238.2± 206.5	202.5± 199.2	205.11±1.06 P_1>0.1	220.04±198.3 P_1<0.001. P_2<0.001
Transferrin, mg/dl	215.5 ± 49.1	188.2± 37.5	190.5±25.6 P_1>0.1	197.7±30.2 P_1<0.05

Note: P – significance of the difference between the parameters of healthy people and in children with chronic pyelonephritis. P1 – significance of the difference between the parameters before and after treatment. P2 – reliability of the difference between the traditional and the group of children who received the drug "Askozhel"

Thus, in children with CP who received conventional therapy before discharge from the hospital, the level of serum iron content slightly increased and amounted to 12.37 ± 0.02 and 11.97 ± 0.02

μmol/L ($P_1 > 0.1$), this indicator in patients with the use of Askozhel was significantly higher in both forms of pyelonephritis and significantly differed from the indicators of group 1 (13.9 ± 0.1 $P_1 < 0.05$, $P_2 < 0.05$ in children with ChPP and 13.1 ± 0.5 μmol/l, $P_1 < 0.01$, $P_2 < 0.01$ in children with ChSNObP, significantly approaching the indicators of healthy children.

When compared with the healthy group, the ferritin content in patients of group 2 with ChPP was closer to the standard values (225.7 ± 190.3 μg/L versus 238.2 ± 206.5 μg/L) than in ChSNObP (220.04 ± 198.3 μg/L versus 238.2 ± 206.5 μg/L) and significantly differed from the indicators of group 1 (210.4 ± 1.13 μg/L with ChPP and 205.11 ± ± 1.06 μg/L with ChSNObP, $P < 0.001$).

Transferrin is an acidic glycoprotein consisting of a single chain, on which there are 2 sites that actively bind Fe. The synthesis of transferrin occurs in accordance with the content of Fe in the body: with IDS, the transcription of transferrin messenger RNA (mRNA) increases, and with normalization of the Fe level, it decreases. Most of the Fe-transferrin is obtained from hemoglobin during the destruction of old erythrocytes by macrophages. The latter, with the help of heme oxygenase, release Fe from the protoporphyrin ring. Serum transferrin is a source of Fe for all somatic cells. However, Fe is so tightly bound to transferrin that there is a specific mechanism for the entry of the Fe molecule directly into the cell. The transfer of Fe from transferrin to the cell is carried out by the transferrin receptor. Only erythroblasts and reticulocytes, but not adult erythrocytes, can take Fe from transferrin. Binding of transferrin to the receptor is a time, temperature and energy dependent process.

When compared with the group of healthy people, the content of transferrin in patients of group 2 with ChPP was 200.9 ± 32.6 mg/dL versus 215.5 ± ±49.1 mg/dL, ($P_1 < 0.02$, $P_2 < 0.02$), with ChSNObP, it approached the indicators of healthy people (197.7 ± ± 30.2 mg/dl versus 215.5 ± 49.1 mg/dl) and significantly differed ($P_1 < 0.02$, $P_2 < 0.05$) from indicators of group 1 (192.6 ± 28.2 mg/dL, $P_1 > 0.1$ in children with ChPP and 190.5 ± 25.6 mg/dL, $P_1 > 0.1$ in patients with ChSNObP), since against the background of anemia in CP a large number of drugs further depressed the hematopoietic system.

Summarizing the above, it can be noted that the drug "Askozhel" has a positive effect on the state of the circulatory system in patients with CP, increasing serum iron and normalizing the level of transferrin, especially the content of ferritin, while increasing the amount of hemoglobin.

The effectiveness of the inclusion of the drug "Askozhel" in patients with various forms of CP, was expressed not only in the positive dynamics of clinical symptoms, but also in improving the studied parameters of the blood of the body, had significant advantages over the traditional method of treatment in the most significant parameters.

In general, our data show that the use of the drug "Askozhel" in the period of exacerbation of CP promotes a faster transition to the stage of remission. The proposed new approach in the treatment of CP, in our opinion, is of great interest not only for the above properties, but also because it is available for almost any hospital and polyclinic.

Conclusions

1. Anemic syndrome accompanies the active period of CP in 20% of children. Its prevalence is steadily increasing in parallel with the degradation of renal excretory function from 17.0% to 36.4%.

2. The main predictors of anemia in CP are the age of 4–7 years, especially against the background of connective tissue diseases, the identification of concomitant somatic pathology.

3. The use of the drug "Askozhel" in CP is the most acceptable method of therapy. This method contributes to the earlier elimination of the clinical symptoms of the disease, leads to restoration, not only of iron indicators, but also to an improvement in the state of renal function, shortens the period of hospital stay and lengthens the period of remission.

References:

1. Arkhipov E. V. Modern recommendations for the diagnosis and treatment of pyelonephritis from the standpoint of evidence-based medicine / E. V. Arkhipov, O. N. Sigitova, A. R. Bogdanova // Bulletin of modern clinical medicine.– Vol. 8.– No. 6. 2015.– P. 115–120.
2. Valeeva F. V., Kufelkina T. Yu. The state of partial renal functions in patients with type 1 diabetes mellitus with various types of anemia. Siberian Journal of Clinical and Experimental Medicine,– 26 (4–2). 2011.– P. 61–65.
3. Ganuzin V. M. Principles of staged treatment, clinical examination and rehabilitation of children with urinary tract infections.– Yaroslavl, 2012.– 28 p.
4. Korovina N. A., Zakharova I. N., Mumladze E. B., Svintsitskaya V. I. Cystitis in children: etiology, clinical picture, diagnosis and treatment.– M., 2012.– 36 p.
5. Lysova E. V., Savenkova N. D. Mechanisms of development and severity of anemia syndrome in chronic kidney disease in children. Russian Bulletin of Perinatology and Pediatrics.– 60 (3). 2015.– P. 31–36.
6. Prosova E. E., Goremykin V. I. Prediction of exacerbations of chronic pyelonephritis in children // Modern problems of science and education. 2018.– No. 6.
7. Lopatkin N. A., Apolikhin O. I., Pushkar D. Yu. and others // Russian national recommendations "Antimicrobial therapy and prevention of infections of the kidneys, urinary tract and male genital organs".– M., 2014.
8. Atkinson M. A., Furth S. L. Anemia in children with chronic kidney disease. Nat Rev Nephrol – 7. 2011.– P. 635–641.
9. Atkinson M. A., Kim J. Y., Roy C. N. et al. Hepcidin and risk of anemia in CKD: a cross-sectional and longitudinal analysis in the CKiD cohort. PediatNephrol – 30.– 4. 2015.– P. 635–643.