Practical Significance of Early Diagnosis of Kidney Damage in Children

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Abstract: The authors present the results of follow-up observations of children that had undergone neonatal nephropathy. A follow-up observation revealed newborns from mothers with chronic kidney diseases are at risk for the development of neonatal nephropathies. The long-term positive results of the examination of children who underwent neonatal nephropathy and received a course of anti-relapse treatment proved the effectiveness of renal protection.

Keywords: Newborns, Neonatal nephropathy, Anti-relapse treatment, Neonatal period.

THE ACTUALITY OF THE PROBLEM

The problem of kidney damage and its prevention in children is existed in the Republic of Uzbekistan still exists today [1]. The number of sick children with various kidney pathologies has increased significantly over the past few years in Uzbekistan. According to WHO statistics, every 10th inhabitant suffers from some kind of nephro-urological pathology. The kidneys are the one of the organs that determine the purity of the body by removing toxins and decay products from it. Therefore, the kidneys are the natural filter of the human body. Kidney diseases in early childhood lead to the early disability and impaired quality of life. A significant prevalence of kidney disease in women of childbearing age plays an important role [2].

According to G. Piccoli *et al*. (2011) [3], M. Fisher [4], D. Williams, J. Davison [5], chronic kidney disease (CKD) in women of childbearing age is detected in 3-4% of cases , but may also have a higher frequency due to the specificity of the erasure of some of its symptoms during pregnancy in the initial stages of chronic renal failure. Even with a slight decrease in kidney function in pregnant women with CKD due to primary kidney damage, a complicated pregnancy is observed in 25% of cases. A favorable obstetric outcome (completion of pregnancy with the birth of a live child) is observed in 96%, in the case of preeclampsia before 28 weeks of pregnancy, a favorable obstetric outcome is detected in 85% of pregnant women. Further deterioration of kidney function in this category of patients is observed in 8-9% of cases [6, 7].

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Existing chronic kidney diseases negatively affect the course of pregnancy and the health of the expectant mother, increasing the risk of disease progression, the addition of obstetric and perinatal complications, the frequency of which clearly correlates with the stage of CKD, blood pressure and proteinuria [8]. A significant prevalence of kidney disease in women of childbearing age plays an important role [9].

Chronic kidney damage in women during pregnancy that creates the prerequisites for the development of chronic fetal hypoxia, renal ischemia and the formation of anatomical and functional immaturity and the development of neonatal nephropathies induring the early neonatal period [10, 11]. Recently, the number of newborns with congenital obstructive and metabolic uropathy in which the phenomena of nephrosclerosis increases with the growth of the child on the background of urodynamic disorders has increased [12,13]. The frequency of neonatal nephropathies among sick newborns is 34.2% [14]. Therefore, an early diagnosis and correction of disorders is timely renoprotection: anti-relapse treatment prevents the progression of congenital tissue changes and the manifestation of neonatal nephropathies.

AIM OF THE STUD

To evaluate the effectiveness of renoprotection - a complex anti-relapse treatment of neonatal nephropathies in follow-up investigation in newborns.

MATERIAL AND METHODS

84 newborns who had undergone neonatal nephropathy in the neonatal period were under the dispensary observation: 44 newborns received complex treatment with the inclusion of dimesphosphon and α-tocopherol (main group) with the aim of

renoprotection and 40 newborns received basic, conventional treatment (comparison group).

The effectiveness of complex treatment included Dimephosphone and vitamin E in newborns with neonatal nephropathies was evaluated within three years after discharge from the hospital. At the same time, the equivalence of the social conditions in which the children of the main and comparison groups were located was also taken into account. The criteria for the necessity of the treatment in these children were varying degrees of edematous syndrome symptoms: the appearance of pasty eyelids in the morning, urinary (trace proteinuria, oxaluria, microhematuria) and intoxication syndrome.

In the course of dispensary observation in pathological conditions leading to "oxidative stress" (ARVI, pneumonia, otitis, pyelonephritis), a course of anti-relapse antioxidant, membrane stabilizing therapy was carried out on the background of the underlying disease treatment. The course of anti-relapse treatment (renoprotection) consisted of dimephosphone, administered orally based on 50 mg/kg of body weight per day for 5 days and vitamin E 10 mg/kg of body weight orally for 5 days. The basic treatment included etiopathogenetic and symptomatic treatment, and its composition was determined by the severity of renal dysfunction and the depth of metabolic disorders.

RESULTS

In the first year of life, 3 of 15 newborns of the main observation group who underwent a mild degree of edematous syndrome in the neonatal period had 1-2 episodes of urinary tract infection caused by dysmetabolic disorders on the background of cold (trace proteinuria, oxaluria, microhematuria), symptoms of intoxication.

By the age of 2.5-3 years all children with edematous syndrome grade I who received a course of antioxidant, membrane-stabilizing therapy in the acute period did not differ in physical development from healthy children, and the symptoms of nephropathy observed in neonatal and infancy were completely compensated. While the children of the control group, who were on the "basic" treatment, exhibited manifestations of nephropathy up to 3-4 times a year on the background of pneumonia, acute respiratory viral infections and after suffering cold. In addition, 50% of children in this group had disorders of osmotic concentrating and ammonio-acidogenetic functions (Figure **1**).

The formation of kidney functions in newborns who received dimephosphone and vitamin E in the neonatal period occurred much faster than in children who were on the "basic" treatment and by the age of three renal functions did not differ from those in healthy children as well as indicators of physical development.

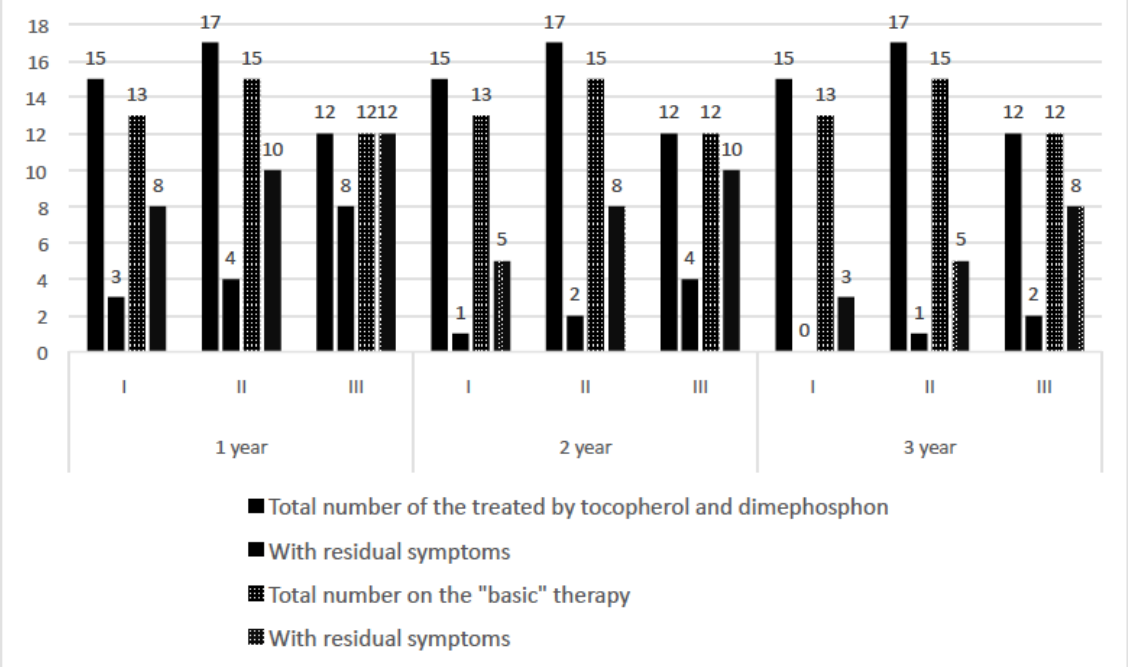

Figure 1: The frequency of residual effects of neonatal nephropathies in the examined children in the follow-up investigation.

Children with edematous syndrome II degree in the neonatal period, who received "basic therapy" significantly lagged in physical development. Children in this group began to sit later (by 10-11 months of age), stand up independently, hold on to the barrier, stand and lower themselves (at 13-15 months of age), began to walk 6-10 months later than children who received the neonatal period treatment for the purpose of renoprotection. Also the pastiness of the eyelids in the morning, swelling on the arms and legs disappeared faster, urine was sanitized, and the osmotic concentrating and ammonio-acidogenetic function was restored faster. A positive effect was also noted in the physical development of the children in this group (the indicators corresponded to those in healthy children).

While at 10 years of age children of the comparison group who underwent edematous syndrome II degree in the neonatal period and were on “basic” treatment, exacerbations of nephropathy were observed 3-4 times by the age of one year, accompanied by proteinuria, leukocyturia, saluria, symptoms of intoxication on the background of acute respiratory viral infections, pneumonia. Chronic pyelonephritis developed at 8 children of this group in 2 years and at 5 children in3 years due to dysmetabolic disorders. These were children from the families with metabolic disorders of uric and oxalic acids. These children lagged behind in physical development, five of them showed signs of rickets (frontal and parietal tubercles and a keeled chest in three children, a shoemaker's chest) and 0- and X-shaped lower limbs in four children.

More expressed residual effects were noted in children who underwent edematous syndrome III degree in the neonatal period due to neonatal nephropathies. All 12 observed children of this group by the age of one year had frequently experienced colds (up to 5-6 times), pneumonia, omphalitis, pustular skin diseases, on the background of which were detected urinary tract infections, dysmetabolic nephropathy, pyelonephritis. Already at an early age, the children showed symptoms of physical development delay: non-closure of a large fontanel, they began to sit, stand with support, and walk later. At the age of 2 years, 5 children within this group were diagnosed with rickets-like diseases: phosphate-diabetes, vitamin D-dependent rickets, 2 children had polycystic kidney disease, 4 children had urolithiasis, and 5 children had dysmetabolic chronic pyelonephritis.

Among these children residual effects by the end of the 1st year were observed in 75%, by the end of the 2nd year - in 57.5%, and by the end of the 3rd year - 40% of children. While among sick newborns who received complex treatment for the purpose of renoprotection, by the age of one, 34% of children suffered from nephropathy, by the 2nd year - 15.9% of children, and by the 3rd year - only 6.8% of children. It was more than 5 times less than those in the children of the comparison group were. All three children suffered from hereditary congenital nephropathies: dysmetabolic chronic pyelonephritis (1 case) and polycystic kidney disease (2 cases).

Early manifestations of kidney damage in newborns from mothers with chronic kidney disease were disadaptation syndrome, manifested by edematous syndrome, pathological weight loss, signs of intrauterine malnutrition, and CNS damage. Disadaptation syndrome in this case was accompanied by disturbances in electrolyte excretory, osmo-concentrating, ammonio-acidogenetic functions and glomerular filtration of the kidneys.

These violations of the functional state of the kidneys were based on an increase in the processes of lipid peroxidation - phospholipase activity, diene conjugates, inhibition of the antioxidant defense of cells, violation of the structure of cytomembranes, namely the phospholipid spectrum. These changes in the stability of cytomembranes preceded the manifestations of the clinical picture, which proves the self-informativeness of biochemical indicators of the stability of cytomembranes.

The role of dimephosphone and vitamin E in maintaining of the stability of the structure and function of cytomembranes and lipid peroxidation processes is significant. The participation of dimephosphone as a membrane stabilizer and α-tocopherol as an antioxidant in the processes of regulation of lipid peroxidation in the body makes their use universal in case of impaired renal function caused by various reasons: whether it is the immaturity of the whole organism and the kidneys, in particular hypoxic, ischemic nephropathies, microbial - inflammatory lesions of the kidneys. However, the best clinical effect is observed in newborns with ischemic dysmetabolic lesions of the kidneys, as well as in the layering of microbial-inflammatory lesions of the kidneys.

CONCLUSION

1. Newborns from the mothers with chronic kidney disease are a risk group for the development of neonatal nephropathy and need to be followed up for 3

years for the purpose of early diagnosis of kidney damage and timely anti-relapse treatment.

2. Long-term positive results of the examination of children who had neonatal nephropathies and received a course of anti-relapse treatment proved the practical importance of early diagnosis and prevention of relapses of nephropathies.

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