Dysfunctional state kidney during postnatal adaptation in the newborn

Abstract: In differentiating renal function in newborns found that the severity and duration of oliguria, the duration of conservation fermeture, poor baby, accompanied by the increase of the pathological condition, i.e ischemic nephropathy varying degrees.

Keywords: neonates, renal dysfunction, fermeture.

Relevance
According to various population-based studies of diseases of bodies of uric system at children is quite widespread (from 29 to 40 per 1,000 child population), tend to grow and tend to the progression [1; 6]. According to most authors, many kidney diseases have their origins in the antenatal period [2]. However, a significant number of antenatal arisen renal disease remains undiagnosed in the neonatal period, often diagnosed only at the maximum severity. Few symptoms and the specific clinical manifestations of diseases of kidneys and urinary tract in newborns and children of first three years of life hinders timely diagnosis, which contributes to chronic process due to late adequate therapeutic correction [4].

Newborn children were more likely to meet the latent form of the nephropathy diagnosed sooner and later lead to the development of chronic kidney disease and disabilities. The most common manifestation of renal damage in the neonatal period is ischemic nephropathy (IN) [7].

It is therefore necessary in the early period of adaptation to predict and diagnose dysfunctional state of the kidneys in newborns. The absence, often, significant clinical signs of nephropathy in newborns due to their nonspecific, requires new informative diagnostic tests, indicating the development of pathological process in the renal tissue.

The identification of renal disease in infants with the use of informative non-invasive diagnostic tests, necessary for the implementation of early diagnosis has been the aim of our study.

Materials and methods
Clinical examination of the newborn was conducted in the early neonatal period is known in neonatology techniques. Identified functional abnormalities of the kidneys in 46 newborn infants. Transient conditions in 26.1 % of children, dysfunctional standing at 56.5 % per cent of children, abnormal standing at 17.4 % of the children. Biochemical study included indicators that change during ischemia and impaired renal function (alkaline phosphatase and cholinesterase in the urine). Analyses were determined on semiautomatic biochemical analyzer lyzer Huma-2000 (Germany) using reagents firm "DiaSys" (Germany). The obtained data were subjected to statistical processing on a personal computer Pentium-IV with the software package Microsoft Office Excel 2003, including the use of built-in functions for statistical processing and Bio Stat for Windows (version 2007). Used the methods of calculus of parametric and non-parametric statistics with calculation of the arithmetic mean of the studied parameter (M), the mean-square deviation (σ), standard error of the mean (m), relative values (frequency, %). The statistical significance of the obtained measurements comparison of average quantitative variables was determined by student’s criterion (t) with the computation of error probability (P) when checking the normal distribution (by the criterion of kurtosis) and equality of General dispersions (F — criterion of Fisher). Statistical significance for qualitative variables were calculated using the χ² criterion (Chi-square) (Glants, 1998, Aviva Petrie, Caroline Sabin, 2009) according to the following formula:

\[ z = \left( p_1 - p_2 \right) \frac{\sqrt{n_i \cdot n_j}}{p(1-p) \cdot (n_i + n_j)} \]

where \( p_1 = \mu_1/n_1 \) and \( p_2 = \mu_2/n_2 \) compare the experimental frequency, and \( p = (\mu_1 \cdot \mu_2)/(n_1 \cdot n_2) \), the average frequency of occurrence of the trait in both groups.

The results of the study and their discussion
Suspected violations of the kidney served as oliguria (less than 15 ml/kg per day) and edematous syndrome. Draws attention to the development of moderate edema syndrome, slowing of urination. Analysis of the duration of signs, has helped us to differentiate the violation of the kidney (Fig. 1).

While maintaining the characteristics of transition States in 7-day-old and older infants, you must treat them as the human kidney and to conduct an additional survey to determine the nature of a nephropathy.

Fig. 1. Duration of preservation of signs that day
Table 1. – Dysfunction of the kidneys in neonatal period

<table>
<thead>
<tr>
<th>Indicator, U/mg creatinine</th>
<th>Age</th>
<th>Transient condition (n = 20)</th>
<th>Dysfunctional state (n = 26)</th>
<th>Pathological condition (n = 8)</th>
</tr>
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<tbody>
<tr>
<td>Alkaline phosphatase</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>5–7 days</td>
<td>115.2 ± 2.4</td>
<td>142.3 ± 1.3***</td>
<td>178.2 ± 1.9***</td>
</tr>
<tr>
<td></td>
<td>2 weeks</td>
<td>89.1 ± 2.8</td>
<td>163.7 ± 2.1***</td>
<td>202.4 ± 1.3***</td>
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<tr>
<td></td>
<td>1 month</td>
<td>37.3 ± 2.7</td>
<td>189.5 ± 1.1***</td>
<td>228.2 ± 1.9***</td>
</tr>
<tr>
<td>The cholinesterase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5–7 days</td>
<td>7.6 ± 0.3*</td>
<td>8.8 ± 0.4*</td>
<td>14.9 ± 0.5*</td>
</tr>
<tr>
<td></td>
<td>2 weeks</td>
<td>6.9 ± 0.4*</td>
<td>10.9 ± 0.2**</td>
<td>19.7 ± 0.41*</td>
</tr>
<tr>
<td></td>
<td>1 month</td>
<td>3.6 ± 0.2*</td>
<td>11.8 ± 0.2**</td>
<td>47.8 ± 4.2**</td>
</tr>
</tbody>
</table>

Note: * — differences with respect to the reflected data are significant (P < 0.05; ** — P < 0.01; *** — P < 0.001).

When children with a high level of alkaline phosphatase (115.2 ± 2.4; 142.3 ± 1.3; 178.2 ± 1.9 U/mg of creatinine) the urine was noted at 5th – 7th day of life. Data E. N. Balbarino (1999), O. L. Chugunova, N. Kulikova Yu (2010) and G. L. Churkina (2011) show that normalization of fermenture in children with ischemic (hypoxic-transient) nephropathy occurred at 5th – 7th day of life.

According to our data, the decline in these indicators was noted by the end of the second week of life, normalization of indicators — by the end of the month of life in children with dysfunctional condition. By the end of early neonatal period activity of alkaline phosphatase in the urine was increased in newborns with a pathological condition of the kidney (P ≤ 0.001) than in healthy children, respectively in 6.2 times.

The cholinesterase is the only enzyme, reflecting the lesion of the glomerular apparatus [3]. We established an increase in the activity of cholinesterase in the urine of examined infants all groups: at 5th – 7th day of life in newborns with a pathological condition (14.9 ± 0.5 Units/mg creatinine, P ≤ 0.001) in 5.7 times, compared with healthy children (7.6 ± 0.3 IU/mg creatinine, P ≤ 0.001), 3.6 times compared with children with DFS (8.8 ± 0.4 U/mg creatinine, P ≤ 0.001). When the dysfunctional state of kidney, the duration of saving giperfermentemtii is probably explained by morphological and functional immaturity of the neonatal kidney, predominantly tubular division. By the end of the neonatal period, cholinesterase activity in newborns with a pathological condition was higher than in healthy children in 8.5 times, and DFS — 2 times. In addition, the clinical picture in these children have found symptoms of intoxication: pallor, lethargy, fatigue sucking, impaired microcirculation.

Conclusions

When differentiation of the functional state of the kidneys in neonates have found that the severity and duration of oliguria, the duration of saving giperfermentemtii, the unsatisfactory condition of the baby, accompanied by increase in pathological conditions, i.e., ischemic nephropathy of different degrees. These diagnostic criteria (tab. 1), reflecting the degree of renal dysfunction, has an informative value for predicting the development and progression of ischemic nephropathy. The severity and duration of oliguria and edema syndrome contributes to an increase in the severity of ischemic nephropathy.

References:
Concomitant intestinal parasitic diseases in pulmonary tuberculosis patients: influence on some immunological indices

Abstract: Impact of concomitant intestinal parasitic diseases on immune state of patients with infiltrative pulmonary tuberculosis (IPT) was studied. Patients with IPT free of intestinal parasites were characterized by significant decrease of relative frequencies of CD3\(^+\), CD4\(^+\), CD8\(^+\)-lymphocytes and increase of the level of total serum IgE in comparison with healthy control. Concomitant ascariasis and giardiasis decreased frequencies of CD3\(^+\), CD4\(^+\), CD8\(^+\)-lymphocytes and increased level total serum IgE for certainty when compared with IPT patients free of parasites. Blastocystosis decreased frequencies of CD3\(^+\), CD4\(^+\)-lymphocytes and increased level total serum IgE for certainty. Concomitant enterobiasis didn’t influence significantly on immunological parameters. Efficient treatment of parasitic diseases increased frequency of CD3\(^+\)-, CD4\(^+\)- and CD8\(^+\)-lymphocytes, decreased concentration of total serum IgE, improved patients condition and tolerance of antituberculosis therapy.

Keywords: infiltrative pulmonary tuberculosis, ascariasis, giardiasis, blastocystosis, enterobiasis, immune state.

Absence of significant successes in control of pulmonary tuberculosis (PT) to a great extent is connected with increase of the number of Mycobacterium tuberculosis strains multiresistant to antituberculosis drugs and disintegration of immune system resulting in domination of Th2-response whereas protection against Mycobacterium tuberculosis is associated with Th1-response. Only 10 \% of cases of PT infection progress to active disease, indicating to efficient immune response in most infected individual [15, 6–24].

Macrophages activated by IFN-\(\gamma\) play a key role in protection against intracellular microorganisms. The main source of IFN-\(\gamma\) is Th1-lymphocytes. Stimulation of Th2-response could inhibit protective reactions of Th1-type [17, 1768–1775]. This fact is of special importance for regions endemic on intestinal parasitic diseases due to the property of helminthes to stimulate chiefly Th2-response and consequently could inhibit Th1-response. Uzbekistan in endemic on intestinal parasitic diseases [1, 16–17]. Previously we found that prevalence of Ascaris lumbricoides and Blastocystis hominis in patients with PT was respectively 5 and 3 times as high as in population. Prevalence of Enterobius vermicularis and Giardia lamblia was at the level of population or lower [10, 3126]. So it was of interest to determine the influence of concomitant intestinal parasitic diseases on a typical for PT immunological imbalance.

Materials and methods. Patients with IPT dominated among individuals under examination and a maximal prevalence of intestinal parasites was found in this cohort, so we detected immune state in these patients. We examined 15 healthy individuals (control), 15 patients with ITL free of parasites, 17 patients with IPT with concomitant ascariasis, 15 patients with IPT and giardiasis, 15 IPT patients with blastocystosis, 15 patients with IPT and enterobiasis. All the patients were at the age of 17–47 years and admitted to Republican specialized scientific research medical center of phthisiology and pulmonology. All the patients received conventional antituberculosis therapy: isoniazide, ethambutol, pyrazinamide, rifampicin, streptomycin.