

ACUTE GLOMERULONEPHRITIS AND RENAL FUNCTIONS IN CHILDREN

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Abstract

One of the important aspects of pediatric pathology is inflammatory diseases of the urinary system, among which various forms of glomerulonephritis deserve special attention [1, 2]. The most constant symptom of glomerulonephritis (GN) in children is hematuria, which can be the leading and only manifestation of the disease. Issues related to acute glomerulonephritis (AGN) have been the subject of discussion in several conferences and publications in recent years [3, 4].

This interest is due to the variety of syndromes based on their mechanisms of development and prognosis (primary, secondary). There are known specific diagnostic and therapeutic difficulties associated with AGN [5, 6]. AGN often begins in childhood, can persist for several decades, and in adults can transform into more severe forms of the disease [7, 8]. We analyzed the indicators of renal functional state (RFS) in various clinical forms of AGN (PGN, VGN) [9].

The aim of this study was to investigate the clinical and laboratory features of the course of primary and secondary GN in children.

Keywords: Acute glomerulonephritis (AGN), Pediatric nephrology, Hematuria, Primary glomerulonephritis (PGN), Renal functional state, Laboratory findings.

Introduction

Materials and Methods: A total of 70 patients with acute nephritis were examined, including 35 with VGN and 35 with primary GN. Patients with acute GN were examined during the period of pronounced clinical manifestations and in dynamics.

RFS was studied in 70 patients (35 with primary GN and 35 with VGN) and in healthy children. For the convenience of comparative analysis of clinical and laboratory symptoms when describing VGN, the principles of classification of glomerulonephritis (2015) were conditionally used.

All patients underwent clinical and laboratory examinations, including general blood analysis, general urine analysis, determination of total protein, protein fractions, residual nitrogen, urea, creatinine, cholesterol, serum transaminases, and glomerular filtration rate (GFR) in serum.

Results of the Study:

Analysis of biopsy material and the functional state of the kidneys in 70 children with AGN (the first group - children with PGN; the second group - patients with VGN) showed that moderate



tubulointerstitial changes were most common (42.7%), while pronounced tubulointerstitial changes were less frequent (37.5%), and insignificant changes in tubulointerstitial tissue were the rarest (20%).

The functional state of the kidneys in all children in these groups was assessed in dynamics during the active stage. In children of groups 1 and 2, the degree of reduction in osmotic concentration and glomerular filtration and the progression of renal function impairment depended on the severity of the inflammatory process (Table 1). No significant differences were found in the studied indicators among these patients. At the same time, the average level of glomerular filtration in these patients, both early in the disease and after treatment, was significantly lower than that indicated in patients in group 1. The average level of GFR in group 2 was significantly lower than in group 1 (Table 1).

Table 1. Indicators of the functional state of the kidneys in children with AGN

Indicator	Healthy Children (n=20)	Group 1 (n=35)	Group 2 (n=35)
Urine Specific Gravity	1022±0.62	1010±0.42 (p<0.001)	1003±1.62 (p<0.001)
Daily Excretion of Titratable Acids (µg/day)	51.0±2.8	25.3±0.45 (p<0.001)	22.3±0.52 (p<0.001)
Daily Ammonium Excretion (µg/day)	46.8±1.2	31.0±0.52 (p<0.001)	29.67±0.58 (p<0.001)
Creatinine (µmol/l)	98.6±7.8	101.3±0.87 (p<0.001)	101.9±0.91 (p<0.001)
Urea (mmol/l)	5.7±0.8	5.21±0.97 (p>0.1)	5.4±0.12 (p>0.1)
Blood Potassium (mmol/l)	4.98±1.18	4.2±0.95 (p>0.1)	4.63±0.78 (p>0.1)
Daily Protein Excretion (mg/day)	0.02±0.003	0.17±0.02 (p<0.001)	0.19±0.03 (p<0.001)
Urine Osmolality (mmol/day)	1000±200	636.6±11.3 (p<0.001)	651.5±16.3 (p<0.001)

Note: p – significance of the difference between the indicators of healthy children and those with AGN.

To clarify the dependence of the functional state of the kidneys on various clinical forms of AGN, the level of partial renal functions in children with nephritic form of PGN was analyzed compared to the same indicators in patients with nephrotic form of VGN (groups 1 and 2).

In group 1, nephrobiopsy was not performed. However, literature data suggested the presence of mild (insignificant and moderate) tubulointerstitial changes in these patients [15, 32, 34, 158].

Renal functions were preserved in 8 children at the time of examination. In 10 (55.6%), a decrease in osmotic concentration was observed (average level 1016.8±0.29), and the average level of glomerular filtration by endogenous creatinine clearance in these children was 76.6±1.48 ml/min. In 7 children with restricted functions, a retrospective analysis of medical histories was conducted. At the time of examination, they had a favorable clinical type. The average level of osmotic concentration in them was 1016.71±0.36, and GFR was 75.29±1.78 ml/min. At the same time, indicators of nephritic syndrome activity in patients of groups 1 and 2 (proteinuria, hypoproteinemia, hypercholesterolemia, hyperglobulinemia) also did not show significant differences.



Thus, in children with AGN, the most common finding was a combined decrease in osmotic concentration and glomerular filtration. With increasing severity of the disease, there was a progression of functional impairments, which was expressed both in the reduction of osmotic concentration and GFR and in the increase in the total number of children with restricted renal functions and the percentage of patients with combined functional disorders. Renal dysfunction was mainly observed in the presence of prognostically unfavorable types.

The inflammatory process affected osmotic concentration and glomerular filtration even in the early stages of the disease. The influence of unfavorable clinical and morphological types was manifested mainly in VGN.

Conclusions:

1. It has been established that the presence of significant proteinuria and tubular disturbances at the onset of GN indicates unfavorable prognostic significance.
2. The need for prolonged nephrological observation is emphasized due to the wave-like course of secondary GN.

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