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LEVEL OF ADAPTATIVE STRESS OF THE ORGANISM AND CELLULAR REACTIVITY OF PATIENTS WITH ACUTE FESTERING-INFLAMMATORY DISEASES OF THE KIDNEYS AND PARANEPHRAL TISSUES

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Abstract

The frequency of purulent-septic complications in diseases of the genitourinary system remains quite high, without a noticeable tendency to decrease, which negatively affects the results of their treatment. The number of complications and relapses remains high, especially in patients of working age. The aim of the study is to research the levels of adaptive stress and cellular reactivity of the body in patients with acute purulent-inflammatory diseases of the kidneys and paranephral tissue.

Material and methods. The study involved 145 patients with acute purulent-inflammatory diseases of the kidneys and paranephral tissue (APIDKPT). The average age of the patients was 45.20±12.81 years. The level of adaptive stress and cellular reactivity of the patients was assessed by a number of indices, using the online tool Red Blood Cell Indices Calculator (Medical Professionals Reference).

Results. In patients with APIDKPT, the absolute number of leukocytes increases by 66.72%, due to an increase in the relative number of neutrophils by 15.83%, which is due to an

increase in the relative number of rod-shaped cells by 3.39 times, the relative number of eosinophils increases by 16.39%, the absolute number of lymphocytes by 25.14%. The overall level of adaptive stress in patients with APIDKPT is 14.29% higher than this indicator in practically healthy individuals. The level of adaptive stress in most patients with APIDKPT is in the stress zone (59.14%) or in the training reaction zone, which distinguishes patients from practically healthy people, in whom adaptive activation is in increased activation (43.90%) or in the zone of calm activation (36.59%).

Conclusions. APIDKPT is a burden not only in terms of clinical, clinical-laboratory and instrumental load, but also in terms of the level of activation of the adaptive stress of the patient's body. The obtained scientific data create the prerequisites for the development of therapeutic and preventive methods for more effective management of such patients.

Keywords: adaptation; body reactivity; sepsis; systemic inflammatory response syndrome; nephritis; pathogenesis.

Introduction

It is well known that the frequency of purulent-septic complications in diseases of the genitourinary system remains quite high, without a noticeable tendency to decrease, which negatively affects the results of their treatment. The number of complications and relapses remains high, especially in patients of working age [1].

It has been convincingly proven that inflammation of the kidneys and paranephral tissue is caused by [2, 3] pathogenic and conditionally pathogenic (E. coli Hly+, E. coli, P. mirabilis) enterobacteria and staphylococci (S. aureus). The human immune system provides protection of the body from substances or living bodies (microorganisms) that carry signs of genetic foreignness or genetic information of other cells, substances, that is, it carries out immunological surveillance, including oncogenic surveillance in the human body. By origin, anti-infectious immunity is divided into species-specific (hereditary, congenital) and acquired (adaptive) specific [4, 5].

The essence of species immunity is determined by the biological peculiarity of the human body. It is non-specific, stable, transmitted by heredity, associated with the characteristics of the genotype of a particular person, including many indicators. It is characterized by the stability of the absolute and relative number of the main indicators of immunocompetent cells, the physiological state (level of adaptive stress) of the organism, the cellular reactivity of the organism, the reactive response of neutrophil leukocytes (the largest, up to 95%, population of immunocompetent cells) of peripheral blood, and the general

indicators of the body's immunological reactivity [6, 7]. These indicators are leading in determining immunological protection, which is the basis for determining analytical indicators of antimicrobial protection - factors and mechanisms of nonspecific anti-infective protection, cellular and humoral links of systemic specific immune protection [8, 9]. The study of the above factors and mechanisms begins with determining the absolute and relative number of immunocompetent cells in peripheral blood.

One of the pressing issues of modern medicine is the problem of individualizing the adaptive (adaptive) response of the body to various stimuli, pathological conditions, diseases, surgical intervention, etc. [10-13]. The human environment is currently characterized by a number of aggressive phenomena, which is typical for an industrially developed, urbanized society. All this together leads to the development of adaptation processes with varying degrees of tension, the formation of stress, which varies at different depths, with different duration and the possibility of compensatory processes. The above requires a restructuring of the body's homeostatic systems, which cannot but be reflected in the state of both individual and collective health, on the structure of the disease of practically healthy people and patients with urological pathology [14, 15]. Therefore, it is advisable to determine the degree of adaptive stress of the body of patients with APIDKPT.

The leading factors that determine the course and severity of the disease are the degree of endogenous intoxication and the immune reactivity of the body. The determination of these indicators is carried out on the basis of the absolute and relative number of the main populations of immunocompetent cells [16, 17].

Compensatory and adaptive mechanisms in acute purulent-inflammatory diseases of the kidneys and paranephrastic tissue (APIDKPT) and disorders of adaptive reactions in these patients remain insufficiently studied.

Purpose of the study. The purpose of this study is to study the levels of adaptive stress and cellular reactivity of the body of patients with acute purulent-inflammatory diseases of the kidneys and paranephral tissue.

Material and methods. The study included 145 patients with acute purulent-inflammatory diseases of the kidneys and paranephral tissue (APIDKPT), who were treated in the urological department of the ONKP "Hospital of Emergency Medical Care" in Chernivtsi.

The inclusion criteria for patients for the study were diagnosed during hospitalization, acute purulent-inflammatory diseases of the kidneys and paranephral tissue (APIDKPT) - renal carbuncle (68% of patients), apostematous nephritis (32% of patients).

The exclusion criteria were: the presence of kidney abscess in patients, since they required

emergency surgery, patients with secondary purulent-inflammatory processes and cancer patients (galvanization is contraindicated in cases of urinary tract obstruction and cancer), bleeding from the upper urinary tract, patients with diabetes mellitus.

When determining the diagnosis, in addition to general clinical symptoms (pain in the affected kidney, fever, shift of the leukocyte formula to the left), the presence of inflammatory infiltrate in the kidney parenchyma according to additional research methods (ultrasound, CT, MRI) was taken into account.

When performing this study, we were guided by generally accepted global and domestic standards in accordance with GCP (1996), the Council of Europe Convention on Human Rights and Biomedicine (dated 04.04.1997), the Helsinki Declaration of the World Medical Association on the Ethical Principles of Conducting Scientific Medical Research Involving Human Subjects (1964-2000), Order of the Ministry of Health of Ukraine No. 281 dated 01.11.2001 and Order of the Ministry of Health of Ukraine No. 616 dated 03.08.2012.

The average age of the patients was 45.20±12.81 years. In the patients of the control group (practically healthy individuals) it was somewhat younger – 43.71±11.46 years versus 46.62±9.81 years in the main group, however, this difference was statistically insignificant ($P>0.05$). A certain predominance of younger individuals in the control group was also within the limits of statistical error.

Blood cell determination was performed by hardware method on the HemoCue analyzer (Sweden). For the purpose of in-depth analysis of the level and type of adaptive stress and cellular reactivity of the organism of patients with APIDKPT, a number of indices were calculated using the Red Blood Cell Indices Calculator (Medical Professionals Reference), as well as according to the methods described in the literature [18]. Statistical processing was performed by the method of variational statistics using the MS Excel 365 program. At a value of $p<0.05$, the difference in results between groups was considered significant..

Results of the study

The results of the study of the absolute and relative number of the main populations of immunocompetent cells in the peripheral blood of patients with APIDKPT are given in Table 1. It was shown that in patients with APIDKPT the absolute number of leukocytes increases by 66.72%, due to an increase in the relative number of neutrophils - by 15.83%. The increase in the relative number of neutrophilic polymorphonuclear leukocytes is due to an increase in the relative number of rod-shaped leukocytes - by 3.39 times, the relative number of eosinophils increases by 16.39%, the absolute number of lymphocytes - by 25,14%.

Table 1

Absolute and relative number of the main populations of immunocompetent cells in peripheral blood in patients with acute purulent-inflammatory diseases of the kidneys and paranephral tissue

Indicators	Units of measurement	Patients with APIDKPT (n=145) M±m	Practically healthy individuals (n=41) M±m	Degree of immune disorders	P
Leukocytes	$\times 10^9$/л	10,62±2,13	6,37±0,51	III	< 0,01
Neutrophil leukocytes	%	71,27±2,81	61,53±1,87	I	< 0,05
Rod-nucleated	%	11,50±1,10	3,39±0,21	III	< 0,001
Segmented nuclear	%	59,82±4,54	58,14±2,11	I	0,05
Eosinophilic leukocytes	%	2,13±0,19	1,83±0,12	I	< 0,05
Lymphocytes	%	20,18±1,56	28,17±1,78	I	< 0,001
	$\times 10^9$/л	2,24±0,21	1,79±0,31	I	< 0,01
Monocytes	%	5,43±0,45	8,47±0,26	II	< 0,001
	$\times 10^9$/л	0,58±0,07	0,54±0,05	I	> 0,05
ESR	мм/год	11,39±0,78	4,43±0,31	III	< 0,001

The above indicates the activation of factors and mechanisms of nonspecific anti-infective defense and the formation of a specific immune response to pathogens of APIDKPT, which confirms the 2.57-fold increase in SZE, which gives the latter an accelerated type. At the same time, in patients with APIDKPT, the relative number of lymphocytes decreases by 39.59% and monocytes - by 55,99%.

Thus, in patients with APIDKPT, upon admission to inpatient treatment, the absolute number of leukocytes and monocytes significantly increases, as well as the relative number of polymorphonuclear neutrophilic leukocytes, mainly due to rod-shaped and eosinophilic leukocytes, but the relative number of lymphocytes and monocytes decreases. The degree of immune disorders was determined in 3 cases - III (30.0%), II (10.0%), the first degree was determined in 60% of cases.

This is also confirmed by a decrease in the relative number of monocytes and the formation of a tendency to decrease (due to participation in the immune response) in the relative number of lymphocytes, but also by the established increase in the absolute number of these cells - the main figure of specific immunity.

The results of studying the influence of the level of adaptive stress of the body of patients with APIDKPT are given in Table 2.

Table 2

Level of adaptive stress of the body of patients with acute purulent-inflammatory diseases of the kidneys and paranephral tissue

Level of adaptive stress	Patients with APIDKPT (n=145)	Practically healthy individuals (n=41)	Degree of violations	P
General level	0,35±0,04	0,48±0,05	I	0,028
Stress	98-67,59%	0	III	–
Training reaction	47-32,41%	8-19,51%	III	–
Zone of calm activation	0	15-36,59%	III	–
Zone of increased activation	0	18-43,90%	III	–

In the stress zone, 98 (67.59%) patients were identified, in the training reaction zone - 47 (32.41%) patients.

The overall level of adaptive stress in patients with APIDKPT is 14.29% higher than this indicator in practically healthy individuals. The level of adaptive stress in most patients with APIDKPT is in the stress zone (59.14%) or in the training reaction zone, which distinguishes patients from practically healthy people, in whom adaptive activation is in increased activation (43.90%) or in the calm activation zone (36,59%).

Conclusions

The contingent of patients with APIDKPT is burdened not only by clinical, clinical-laboratory and instrumental data, but also by the level of activation of the adaptive stress of the patient's body. The obtained scientific data create the prerequisites for the development of therapeutic and preventive methods for more effective management of such patients.

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