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A Correction of Parameters of Cellular and Humoral Immunity in the Complex Treatment of Patients with Chronic Pyelonephritis on the Background of Hemoblastosis

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Leukemic clone, the usage of chemotherapy, glucocorticoid hormones, which have cytotoxic effects not only on the tumor, but also on immunocompetent cells, are favorable factors for infectious diseases in patients with hemoblastosis. One of the most frequent opportunistic infections of hematology patients is pyelonephritis (20-30% of cases). In the study, we studied the effect of different treatment on the immune status of patients with chronic pyelonephritis combined with hemoblastosis. Attention was paid to the selection of the most optimal treatment schema using immunomodulator medicine “Imunofan” and nephroprotector “Canephron N”, which would have impact, especially in overcoming immune deficiency syndrome. The study showed that in patients with pyelonephritis, indicators of cellular immunity restored during recovery due to receiving basic therapy. At the same time, for patients with chronic pyelonephritis, in combination with hemoblastosis, after using conventional treatment schema, these metrics were unaffected. Improvements were in subgroups that took “Imunofan” and “Canephron N” at the same time.

Keyword: Hemoblastosis, pyelonephritis, immunity, immunomodulator, nephroprotector.

1. Introduction

A tumor process in patients with hemoblastosis occurs on a background of significant changes on the part of cell-mediated and humoral immunity[4]. Symptoms of disorders of the immune system and related diseases that are evolving on this background represent a syndrome of secondary immunodeficiency state[3].

An important factor that alters the function of immune system of patients with hemoblastosis, except leukemic clone, is the usage of chemotherapy, glucocorticoid hormones, which have cytotoxic effects not only on the tumor, but also on immunocompetent cells, after which comes a general immunosuppression. Infectious diseases are often joining because of that, the greatest risk of appearing such is observed in the first three months after the start of chemotherapy, as well as progression or relapse period of disease, which is considered as negative prognostic factor[2].

One of the most frequent opportunistic infections in hematology patients is a chronic kidney disease: pyelonephritis, which on the background of the syndrome of secondary immunodeficiency state evolves in 20-30% of patients with hemoblastosis. This process often has slight relapsing passing[1,5,6].

The aim of our study was to examine the influence of immunomodulator medicine "Imunofan" and nephroprotector "Canephron N" on immune parameters of patients with chronic pyelonephritis on the background of hemoblastosis.

2. Materials and Methods

140 people were investigated. The main group included 100 patients with combined pathology of pyelonephritis on the background of hemoblastosis. For comparison examined 20 patients with pyelonephritis without concomitant hematologic pathology (comparison group). For control were taken 20 healthy persons without any existing pathology.

The main group was divided into four sub-groups of 25 people each, depending on treatment. Patients of the I subgroup treated pyelonephritis in accordance to existing regulations by conventional methods with the additional intake of synthetic immunomodulator "Imunofan"; II subgroup, in addition to basic treatment, received maintenance therapy by herbal nephroprotector "Canephron N"; III subgroup, in addition to basic treatment, treated with maintenance therapy "Imunofan" and "Canephron N"; IV subgroup - patients who received basic treatment according to MOH of Ukraine "On approval of the protocols of care in "Nephrology" and auxiliary treatment if necessary accordingly to MOH of Ukraine "On approval of clinical protocols of medical care in the specialty "Hematology". It should also be noted that the studied patients previously treated with chemotherapy.

Schemas of appointed medicines: "Imunofan" - 1 ml of 0.005% solution intramuscularly once a day for 5 days, then every other day for another 5 injections; "Canephron N" - 2 tablets (or 50 drops) 3 times a day for a month[8].

Indices of cellular and humoral immunity of all the patients were studied. The examination was carried out on admission to hospital and at 10-14 days of treatment. All patients were correlated by age and gender. The average age was (62,42 ± 1,08) years.

3. Results and Discussion

Studied the effect of different treatment schemas on the immune status of patients with chronic pyelonephritis combined with hemoblastosis. Attention was paid to the selection of the most optimal treatment schema that would have impact, especially in overcoming immune deficiency syndrome[7].

Assessing immunograms of patients (Table 1) of the first subgroup who used the medicine "Imunofan" at 10-14 days of therapy, it was noticed an increase in the total number of T-lymphocytes (45,08 ± 0,52)%, which was at 14.29% above the initial data (38,64 ± 0,94)%. T-helper cells also raised (27,04 ± 0,35)% compared with the previous result (21 ± 0,51)%, and cytotoxic lymphocytes got almost no change and remained at the same level (18,04 ± 0,21)% . Latest contributed significantly to increase of immunoregulatory index, which was different from the initial values (1,19 ± 0,009) in 1.25 times.

Patients who received, in addition to basic therapy, the "Canephron N" (subgroup II) or only standard treatment program (IV subgroup) had no significant changes in immune status. Thus, T-lymphocytes of the original values (38,88 ± 0,87)% and (38,32 ± 0,73)% respectively increased within two percent, which were (39,6 ± 1,05)% and (39,28 ± 0,90)%. Almost no differences were observed between the values of T-helper cells before and after receiving medication. However, the level of T-suppressor cells slightly decreased after suffered an infectious-inflammatory diseases and observed in the second subgroup before treatment (18,12 ± 0,49), after (17,2 ± 0,38), similar in IV - before (18,04 ± 0,45) and after (17,04 ± 0,29). Although, significant changes in immunoregulatory index was not observed, but it passed the mark 1,2.

In the third subgroup, where patients were receiving additional medicines "Imunofan" and "Canephron N", indicators of immune status tended to achieve values of norm. Thus, T-cells grew by 15.47% from the original numbers (39,56 ± 0,93)% and got (46,8 ± 0,51)%. Also

marked increase in CD4+-cells by 24.79% - from (21,24 ± 0,46)% to (28,24 ± 0,28)%. Regarding immunoregulatory index - it also increased in 1.3 times.

Comparing data on persons with chronic pyelonephritis in combination with hemoblastosis treated with various medications depending on the distribution by subgroups, and patients with chronic pyelonephritis without concomitant diseases (comparison group) who received conventional basic therapy, it should be noted that data had certain differences. Number of T-lymphocytes after treatment was (53,25 ± 0,49)%, i.e. in 1.29 times higher than at admission (41,3 ± 0,73)%, which was close to the normal control group (61, 05 ± 0,75)%. The level of T-helper cells in early disease (23,2 ± 0,44)% was in 1.39 times lower than the 10-14 day treatment - (32,15 ± 0,31)%. This contributed to the growth of immunoregulatory index from 1.28 to 1.52.

Table 1: Indicators of cellular immune status of patients with chronic pyelonephritis on the background hemoblastosis depending on the treatment received

Indicators, units	Almost healthy people group (n=20)	I subgroup (n=25)		II subgroup (n=25)		III subgroup (n=25)		IV subgroup (n=25)	
		Before treatment	On 10-14 day of treatment	Before treatment	On 10-14 day of treatment	Before treatment	On 10-14 day of treatment	Before treatment	On 10-14 day of treatment
CD3+-lymphocytes, %	61,05±0,75	38,64±0,94	45,08±0,52*	38,88±0,87	39,6±1,05	39,56±0,93	46,8±0,51*	38,32±0,73	39,28±0,90
CD4+-helpers, %	39,85±0,54	21±0,51	27,04±0,35*	21,52±0,57	21,68±0,51	21,24±0,46	28,24±0,28*	21,24±0,47	21,28±0,45
CD8+-suppressors, %	21,2±0,26	17,64±0,44	18,04±0,21	18,12±0,49	17,2±0,38	18±0,45	18,56±0,27	18,04±0,45	17,04±0,29
CD4+/CD8+	1,88±0,02	1,19±0,009	1,49±0,02*	1,19±0,007	1,26±0,009	1,18±0,007	1,53±0,016*	1,18±0,009	1,25±0,009
CD16+-lymphocytes, %	20,45±0,52	29,68±0,49	29,08±0,40	29,4±0,49	30,92±0,31	29,56±0,54	27,88±0,29	29,8±0,44	30,32±0,69

Note: * - the reliability of the difference between the parameters before treatment and after treatment ($p < 0,05$).

Thus, we can make the conclusion, for patients with pyelonephritis, indicators of cellular immunity restoring during recovery due to receiving basic therapy. At the same time for patients with chronic pyelonephritis combined with hemoblastosis, after using conventional treatment schema, these indicators unaffected. Improvement was seen in subgroups that further took “Imunofan”.

Studied B-lymphocytes (Table 2) indicated increasing their levels in patients with combined pathology. After treatment the results were as follows: in the first subgroup of the initial value (28,24 ± 0,57)% decreased to (22,28 ± 0,35)%, which was similar to the results in the third subgroup - (27,48 ± 0 37)% at admission to hospital and (21,84 ± 0,52)% at 10-14 days of treatment. In II and IV subgroups who received basic therapy with the “Canephron N” and the standard schema, respectively, rates did not experience significant changes and their difference was more than 5%.

Table 2: Dynamics of B-lymphocytes in the treatment of patients with chronic pyelonephritis in combination with hemoblastosis, (M ± m)

Studied group	B-lymphocytes level, %		p
	Before treatment	After treatment	
I subgroup, n=25	28,24±0,57	22,28±0,35	<0,05
II subgroup, n=25	27,8±0,65	26,2±0,61	>0,05
III subgroup, n=25	27,48±0,37	21,84±0,52	<0,05
IV subgroup, n=25	27,56±0,37	26,04±0,39	>0,05
Patients with chronic pyelonephritis, n=20	30,5±0,54	17,6±0,5	<0,001
Healthy persons, n=20	15,85±0,23		

Note: p - reliability of difference between parameters before treatment and after treatment.

For patients who were included in the comparison group and complained of exacerbation of chronic pyelonephritis, after treatment according to approved protocols, the number of CD19 +-cells reached (17,6 ± 0,5)%, in 1.73 times lower than the original values (30,5 ± 0,54)%.

Past surveys shown (Table 3) that in healthy individuals the level of immunoglobulin was: IgA (2,27 ± 0,18) g/l, IgG (14,96 ± 0,48) g/l, IgM (1,26 ± 0,09) g/l (p < 0,05). In patients with a combination with chronic pyelonephritis and hemoblastosis, the level of IgM tended to increase. However, by using different treatment schemas, we got excellent results. I and III subgroup decreased in 1.7 times the value of IgM and constituted accordingly (1,81 ± 0,08) g/l and (1,73 ± 0,04) g/l. The metrics for II and IV subgroups did not undergo significant changes, the value from initial (2,79 ± 0,21) g/l (2,99 ± 0,16) g/l hardly changed and made (2,77 ± 0, 20) g/l and (2,73 ± 0,14) g/l, respectively (p > 0,05). Patients who complained only on kidney disease, had significantly high numbers of immunoglobulin M (3,98 ± 0,26) g/l, but after standard treatment schema, these values decreased to the level of healthy individuals (1,3 ± 0,13) g/l (p < 0,05).

Table 3: Humoral immune status of patients with chronic pyelonephritis on the background hemoblastosis depending on the treatment received.

Indicators, units	Almost healthy people group (n=20)	I subgroup (n=25)		II subgroup (n=25)		III subgroup (n=25)		IV subgroup (n=25)	
		Before treatment	On 10-14 day of treatment	Before treatment	On 10-14 day of treatment	Before treatment	On 10-14 day of treatment	Before treatment	On 10-14 day of treatment
IgA, g/l	2,27±0,18	1,05±0,12	1,64±0,12	1,56±0,15	1,64±0,18	1,18±0,15	1,46±0,13	0,99±0,09	1,08±0,09
IgG, g/l	14,96±0,48	6,16±0,20	9,82±0,44	6,83±0,25	7,14±0,32	7,58±0,32	12,02±0,59	8,17±0,36	9,56±0,76
IgM, g/l	1,26±0,09	3,11±0,20	1,81±0,08	2,79±0,21	2,77±0,20	2,95±0,12	1,73±0,04	2,99±0,16	2,73±0,14

Note: * - the reliability of the difference between the parameters before treatment and after treatment (p < 0,05).

Regarding IgG values in the studied subgroups, they were quite reduced. IgG in subgroups I and III was before treatment (6,16 ± 0,20) g/l (7,58 ± 0,32), and after - (9,82 ± 0,44) g/l (12 , 02 ± 0,59) g/l, respectively, representing the difference in both cases in 1.59 times. In the other two subgroups, these metrics were increased slightly: in the second subgroup from (6,83 ± 0,25) g/l to (7,14 ± 0,32) g/l, IV - from (8,17 ± 0, 36) g/l to (9,56 ± 0,76) g/l.

In patients with chronic pyelonephritis, value of immunoglobulin G before treatment was (19,51 ±

0,55) g/l, and on the 10-14 day treatment slightly decreased to (17,42 ± 0,31) g/l.

For values of immunoglobulin A, were minor changes in some subgroups: in the I subgroup the index increased from (1,05 ± 0,12) g/l to (1,64 ± 0,12) g/l, II subgroup - from (1,56 ± 0,15) g/l to (1,64 ± 0,18) g/l, III - from (1,18 ± 0,15) g/l to (1,46 ± 0,13) g/l and IV subgroup numbers varied from (0,99 ± 0,09) g/l to (1,08 ± 0,09) g/l.

4. Conclusions

1. In most patients with hemoblastosis observed a significant decrease in immunoglobulin A and G in serum, at a time immunoglobulin M increases.
2. Usage of immunomodulator “Imunofan” in the treatment of patients with chronic pyelonephritis on the background hemoblastosis leads to effective correction of immune disorders and improves treatment.
3. In case of prescription of nephroprotector “Canephron N” in complex therapy with exacerbations of chronic pyelonephritis on the background hemoblastosis, it is seen faster normalization of immune parameters that is due to, probably, reducing inflammation in the kidneys and effective influence on the causative agent.

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