INDICATORS OF BLOOD FERRITIN LEVEL IN PATIENTS WITH APLASTIC ANEMIA

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Abstract: *iron overload develops as a result of its excessive accumulation in parenchymal organs, which subsequently leads to their damage and dysfunction. The assessment of the body's iron storage is carried out indirectly by determining the concentration of ferritin in the blood serum. However, the concentration of ferritin in the patient's blood serum is associated with the presence of inflammation, with ascorbate deficiency, and also depends on liver function, which significantly limits the diagnostic value. Iron by nature is a ferromagnet, its nuclei have their own magnetic moments, which, when hitting a strong magnetic moment, line up parallel to each other and greatly shorten the relaxation time of the magnetic field. In the last 20 years, magnetic resonance imaging (MRI) has been actively used to determine and calculate the amount of accumulated iron in various organs - liver, heart, pancreas, pituitary gland, etc.*

Keywords: *aplastic anemia, myelodysplastic syndrome, magnetic resonance imaging, ferritin.*

ПОКАЗАТЕЛИ УРОВНЯ ФЕРРИТИНА КРОВИ У БОЛЬНЫХ С АПЛАСТИЧЕСКОЙ АНЕМИЕЙ

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Аннотация: *перегрузка железом развивается в результате избыточного его накопления в паренхиматозных органах, впоследствии приводит к их повреждению и дисфункции. Оценку запаса железа в организме проводят косвенно - путем определения концентрации ферритина в сыворотке крови. Однако концентрация ферритина в сыворотке крови больного связана с наличием воспаления, с дефицитом аскорбата, зависит также от функции печени, что значительно ограничивает диагностическое значение. Железо по своей природе - ферромагнетик, его ядра обладают собственными магнитными моментами, которые при попадании в сильное магнитное поле выстраиваются параллельно друг другу и сильно укорачивают время релаксации магнитного поля. В последние 20 лет магнитно-резонансную томографию (МРТ) активно используют для определения и подсчета количества накопленного железа в различных органах - печени, сердце, поджелудочной железе, гипофизе и др.*

Ключевые слова: *апластическая анемия, миелодиспластическим синдром, магнитно-резонансная томография, ферритин.*

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A necessary component of modern therapy for aplastic anemia (AA) is an adequate transfusion supply, in particular, transfusion of erythrocyte mass [1, 2]. At the same time, it is known that transfusions of donor erythrocytes cause the development of secondary siderosis, and the carriage of hereditary hemochromatosis gene mutations aggravates the formation of iron overload in the body [3, 4].

In patients with chronic hepatitis and cirrhosis of the liver, as a result of repeated blood transfusions, iron overload may also develop, which exacerbates the risk of progression of chronic liver disease. In the research of M.L. Zubkina et al. Showed that antiviral therapy in combination with massive bloodletting, clinical observation of a patient with chronic hepatitis B allowed stabilization of chronic liver disease [5].

In the studies of V.G. Savchenko. et al. have shown the results of chelation therapy in transfusion-dependent patients with myelodysplastic syndrome (MDS), whose serum ferritin values were 1000 μg / L or more. In a prospective open multicenter study, the safety and efficacy of deferasirox therapy in transfusion-dependent patients with MDS, as well as rare forms of anemia, was evaluated. The results showed that chelation therapy can effectively reduce the iron content in the patient's body. The mean serum ferritin value decreased from 3837.2 to 2269.2 μg / L. What is a statistically significant criterion for the effectiveness of chelation therapy [6].

Materials and research methods. The object of the study was 20 patients with a diagnosis of AA, who were treated at the Research Institute of Hematology and Blood Transfusion clinic. The age of the patients was from 19 to 67 years old, on average 39.79 ± 3.64 years. 11 women, 9 men, 12 urban residents, 8 rural residents. All patients underwent a general blood test on a MINDRAYBC-2300 hematology analyzer, ferritin values were determined on a RENDEX biochemical analyzer (Daytona). The ferritin concentration norm was 10-120 ng / L. Myelogram and coagulogram were calculated. The anamnesis was studied, in particular the volume of transfused blood for the entire period of the disease, which ranged from 1518 liters to 9960 liters, the average volume was 5778.11 ± 633.87 liters. The duration of the disease was 1-12 years, on average 2.86 ± 0.64 years.

Results and discussion. Blood transfusions are widely used in clinical practice as a quick and effective method for correcting anemia. Most often, transfusions are used in hematology oncology, including in patients with aplastic anemia. Indications for blood transfusion occurs when hemoglobin decreases below 65-80 g / l, if it is accompanied by clinical symptoms of hemodynamic disturbance (tachycardia, shortness of breath, decreased blood pressure, etc.). However, existing clinical guidelines for the treatment of anemia do not recommend long-term blood transfusion therapy in hematological cancer patients due to the risk of iron overload and sensitization to blood antigens. Patients with AA deserve special attention, who are forced to be on constant blood transfusions for life, and therefore have a high risk of iron overload. In our study, we observed 20 patients with AA who received regular blood transfusions (once a month). The results of the study are shown in table 1.

Table 1. Indicators of blood ferritin concentration depending on some indicators

№	Indicators	Ferritin indices ng/l M ± m	Reliability
1	Age		
a	19-40 year (n=11)	1155±145,2*	(P>0,5)
в	41-67 year (n=9)	884±139,1*	
2	Blood transfusion volume		
a	1-6 liter (n=11)	801±128,4**	(P<0,05)
в	7-9 liter (n=9)	1317±140,5**	
3	Duration of illness		
a	6 month- 1 year 11 month (n=12)	693,6±120,1**	(P.<0,05)
в	2-12 year (n=8)	1260±145,5**	
4	Sex		
a	Men (n=9)	985±119,5*	(P>0,5)
в	Women (n=11)	1073±123,2*	

Note:
* - the difference is insignificant (P> 0.5)
** - the difference is significant (P <0.05)

The study of blood ferritin indicators depending on age indicates that at the age of 19-40 years, the concentration of ferritin was 1155 ± 145.2 ng / l, at the age of 41-67 it was 884 ± 139.1 ng / l, however, there was no significant difference in indicators revealed (P> 0.5). The study of ferritin concentration depending on the volume of blood transfusion made it possible to establish a significant difference in indicators: in patients who received blood transfusion in the amount of 1-6 liters per year, ferritin indicators were 801 ± 128.4 ng / l, and in patients who received more than 6-9 liters of weight per year the level of ferritin was 1317 ± 140.5 ng / l, the difference is significant (P <0.05).

Consequently, the greater the volume of blood transfusion, the higher the risk of developing iron overload.

Ferritin indices were also studied depending on the duration of the disease and the following was found: with the duration of the disease up to 2 years ago, the ferritin level was 693.6 ± 120.1 ng / l, and with the duration of the disease 2-12 years 1260 ± 145.5 ng / l , the difference is significant (P. <0.05). Thus, the risk of developing iron overload directly depends on the duration of the disease: the longer the duration of the disease, the higher the ferritin values. In our studies, the dependence of ferritin indicators on gender was studied, while the data showed no relationship (P> 0.5).

In the literature we studied, there are very few data on the study of iron overload in transfusion-dependent hematological patients, including patients with AA. Retrospective studies of the medical history of patients with AA show that practitioners do not pay due attention to the issues of iron overload, ferritin indicators are not studied, and therefore timely chelation therapy is not carried out. As literature sources show (1, 2, 3, 4, 5), iron

overload causes dysfunction of the internal organs - heart, liver, spleen, pancreas, pituitary gland, etc. heart, spleen, etc. When iron overload syndrome is established, pathogenetic therapy (chelation) is necessary.

Conclusions:

1. In patients with AA, with a disease duration of 1 year or more, in 100% of cases, ferritin indices increase by almost 10 times.

2. Ferritin values in patients with AA depend on the duration of the disease and on the volume of blood transfusions received: the longer the duration of the disease and the volume of blood transfused, the higher the ferritin values and the higher the risk of hemosiderosis.

3. Indicators of ferritin does not depend on the sex and age of the patients.

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