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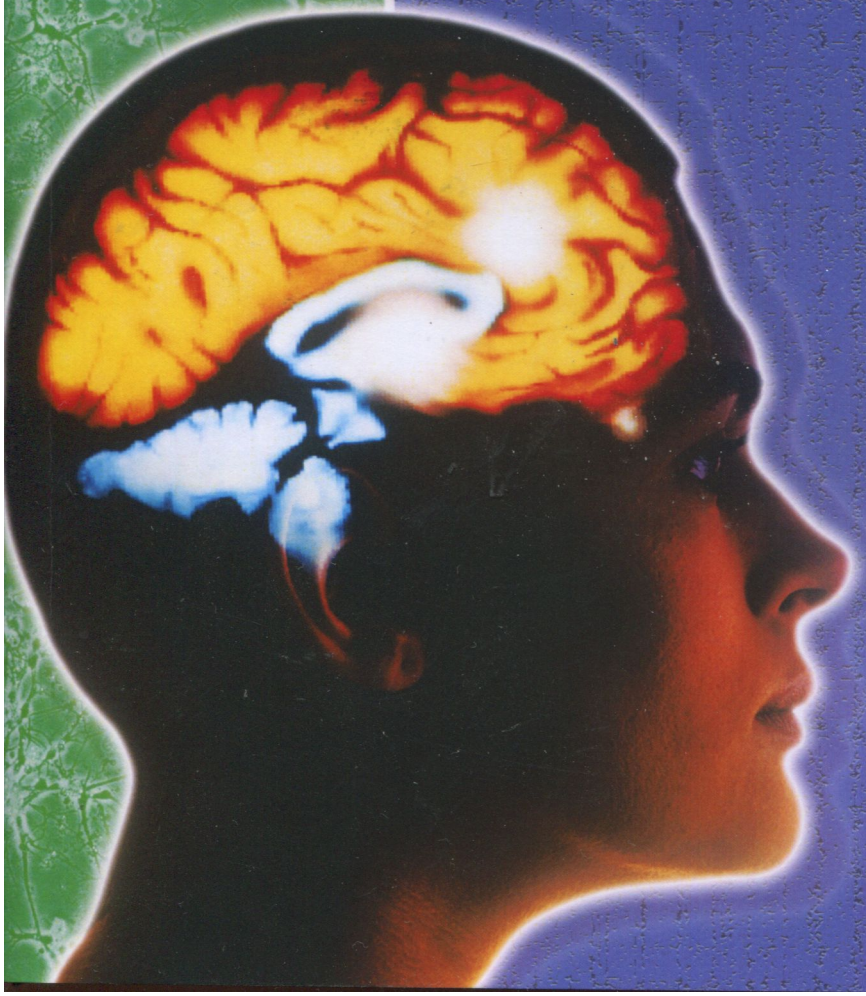

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HEMATOLOGICAL INDICATORS OF BLOOD RABBITS IN THERAPY OF LIMB BONE FRACTURES WITH PLASMA ENRICHED WITH PLATE

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Tashkent Medical Academy, Bukhara State Medical Institute

Key words: autologous platelet-rich plasma, peripheral blood, hematological parameters, traumatology, rabbits, reparative osteogenesis.

ГЕМАТОЛОГИЧЕСКИЕ ПОКАЗАТЕЛИ КРОВИ КРОЛИКОВ ПРИ ТЕРАПИИ ПЕРЕЛОМОВ КОСТЕЙ КОНЕЧНОСТИ ОБОГАЩЕННОЙ ТРОМБОЦИТАМИ ПЛАЗМОЙ

Хегай Л.Н., Гаффоров А.У.

Ключевые слова: аутологичная плазма обогащённая тромбоцитами, периферическая кровь, гематологические показатели, травматология, кролики, репаративный остеогенез.

Введение в организм аутологичной плазмы обогащённой тромбоцитами (autologous platelet-rich plasma) – АПОТ (APRP). является одной из перспективных процедур в восстановлении тканей. После разрушения тромбоцитов АПОТ содержит α-гранулы, из которых после активации высвобождаются трансформирующий фактор роста-бета (TGF-β), фактор роста эндотелия сосудов (VGFF) и эпидермальный фактор роста (EGF). Изучение гематологических маркеров крови позволяет косвенно оценить терапевтический эффект АПОТ.

ТРОМБОЦИТЛАРГА БОЙ ПЛАЗМА БИЛАН СУЯК СИНИШЛАРИНИ ДАВОЛАШДА ҚУЁН ҚОНИНИНГ ГЕМАТОЛОГИК КЎРСАТКИЧЛАРИ

Хегай Л.Н., Гаффоров А.У.

Калит сўзлар: тромбоцитлар билан бойитилган аутолог плазма, периферик қон, гематологик кўрсаткичлар, травматология, қуёнлар, репаратив остеогенез.

Тромбоцитлар билан бойитилган аутолог плазмани (autologous platelet-rich plasma) – ТБАП (APRP) организмга киритиш. тўқималарни тиклашдаги энг истиқболли муолажалардан бири ҳисобланади. Тромбоцитлар парчаланганидан кейин ТБАП α-гранулаларга эга бўлади, мазкур гранулалар фаоллашганидан сўнгра трансформацияловчи бета-ўсиш омили (TGF-β), томир эндотелиал ўсиш омили (VGFF) ва эпидермал ўсиш омили (EGF) ажратиб чиқаради. Қоннинг гематологик белгиларини ўрганиш ТБАП нинг терапевтик таъсирини билвосита баҳолашга имкон беради.

At present, the technology of treatment with autologous platelet-rich plasma (APRP) is widely used in medicine. Due to the natural properties of platelet-rich plasma, its introduction into the body is one of the most promising procedures in tissue restoration. After platelet destruction, APRP contains α-granules, from which, after activation, many factors are released, such as transforming growth factor-beta (TGF-β), vascular endothelial growth factor (VEGF) and epidermal growth factor (EGF) [1]. The effectiveness of APRP in wound healing and tissue restoration in maxillofacial surgery, cardiac surgery, ophthalmology, orthopedics, plastic surgery, sports medicine and cosmetology has been proven [2].

In our studies, APRP-therapy was tested on an experimental model of bone fractures in the extremities of rabbits in order to stimulate bone regeneration and healing of postoperative wounds. The therapeutic effects of APOT are still controversial due to the lack of optimized and standardized protocols for optimal conditions for whole blood centrifugation. We have tested a technique for obtaining platelet-rich plasma by two-stage centrifugation of autologous blood from a rabbit ear vein on a tabletop centrifuge TDZ4-4Ws (China). The initial concentration of platelets in platelet-rich plasma averaged 590.58 ± 25.69 (109/L). The effectiveness of APRP therapy was preliminary estimated based on the results of studies of hematological parameters of the peripheral blood of experimental animals.

Clinical blood test remains the most common laboratory test. Meanwhile, the potential clinical potential of this routine method for bone fractures has not been sufficiently explored. The information content of the leukocyte index of intoxication (LII), the index of the severity of intoxication (ISI), the hematological index of intoxication (HII) in patients with tumors of various localizations, inflammatory and purulent diseases of the lungs, abdominal organs, soft tissues has been reliably proved to determine the prognosis of their development and the severity of the course [3.4]. The clinical significance of these indicators lies in their definition as criteria that help, along with clinical data, to diagnose the progression of the process and the development of complications.

Purpose: to study the hematological parameters of the blood of rabbits in the dynamics of treatment of experimental bone fractures using APRP.

Object of research: hematological parameters in traumatic fractures of the diaphyseal tubular bones of rabbits.

Research materials. Experimental studies were carried out on a model of diaphyseal fractures of the femur of 66 outbred male chinchilla rabbits weighing 2.5-3.5 kg at the age of 11-12 months. All experimental animals were divided into 3 groups. The 1st intact group consisted of 6 healthy individuals, the 2 and 3 experimental groups were divided into 30 individuals each. In the 2 group, APRP was not used, in the 3rd experimental group, therapy included intramuscular administration of APRP, starting from the 3 day of the experiments.

Research methods: experimental, clinical laboratory and statistical.

Preclinical studies of the effectiveness of APRP in the treatment of diaphyseal fractures of tubular bones were carried out according to the agreement on scientific cooperation No. 01-20 of February 11, 2020 with the Bukhara State Medical Institute.

The studies were carried out on the basis of the departments of pharmaco-toxicological, biological, immunological research and cellular technologies with electron microscopy of the Interuniversity Research Laboratory of the Tashkent Medical Academy (IRL TMA). Experimental modeling of diaphyseal fractures of the femur was carried out on 60 outbred male chinchilla rabbits weighing 2.5-3.5 kg at the age of 11-12 months. The animals were kept in the vivarium of the MNIL TMA on a standard diet, taking into account the provisions of the international convention on the "Rules for working with experimental animals" [5,6]. The experiments were carried out in strict accordance with the International Ethical and Scientific Standards for the Quality of Planning and Conducting Animal Research [7] and the Good Laboratory Practice (GLP) [8].

Research results and discussion. After 2 weeks of quarantine,

the rabbits were carefully examined, weight, appearance, physical activity and reactions to reflexes were taken into account. Laboratory animals were kept in standard vivarium conditions and were on a complete laboratory diet with free access to water. The observation of the general condition and behavior of the animals was carried out in dynamics for 7,14,30,60 and 90 days. All experimental animals were divided into 3 groups. 1 intact group consisted of 6 healthy individuals. In the 2nd experimental group, 30 rabbits did not use APRP, in the 3rd experimental group, therapy for 30 animals included intramuscular administration of APOT, starting from the 3rd day of the experiments. For rabbits of both experimental groups under general anesthesia (atropine 0.1% IM, after 5 minutes diphenhydramine 0.7 IM, xylosin 1.0 IM, after 10 minutes Telozol 0.2 IM) under sterile conditions the tibial diaphysis was exposed by a linear incision in the middle third of the leg along the axis of the left hind limb. To create a bone defect, a dental bur-machine was used, with the help of which a comminuted fracture model was performed. The wound was sutured, the skin around the wound was treated with betadine (1 mg of the solution contains 100 mg of active iodine, which corresponds to 10 mg of povidone-iodine) and a sterile bandage was applied. The rabbits of the experimental groups received intramuscular injections of vitamins and antibiotics for the first two days. Experimental animals in the postoperative period received infusion and antibacterial therapy with cephalosporins, painkillers. Animals of the 3rd experimental group, starting from the 3rd day after the osteotomy, were injected intramuscularly with 0.2 ml of platelet-rich plasma at 5 points along the perimeter of the wound surface. In just one session, 1 ml of PRP was injected. APRP therapy was performed every 2 days. The rabbits of the 2nd experimental group were not treated with APRP, the wounds were treated daily with a betadine solution. The animals were withdrawn from the experiment in 6 animals at 7, 14, 30, 60 and 90 days after the operation by euthanasia with a lytic dose of "Isofuran" by means of inhalation anesthesia until complete cardiac arrest and respiration.

The literature highlights protocols describing the optimal conditions for centrifuging autologous blood to obtain platelet-rich plasma. However, various protocols have been optimized for process variables such as whole blood volume, number of rotations, centrifugation time period, and centrifugal acceleration range. Given the complexity of an autologous product such as APRP and the need for quality control in clinical practice, it is essential to demonstrate the ability of a procedure to reproduce consistent results. Despite real differences, all protocols follow a common sequence, which consists of blood collection, initial centrifugation to separate red blood cells, subsequent centrifugation to concentrate platelets and other components, and sample activation by adding a platelet agonist.

APRP is prepared by centrifugation by varying the relative centrifugal force, temperature and centrifugation time. The two-stage procedure gives the highest result [9,10,11,12].

A. Dugrillon et al. proved that the concentration of TGF-β1 and platelets is proportionally related to the forces of centrifugation when the forces are less than 800xg. The concentration of TGF-β1 is inversely related to centrifugal force when its values exceed 800xg [13]. Several studies have pointed out that temperature during processing is critical to prevent platelet activation. J. Araki et al. the tubes were centrifuged at 200C in a refrigerated centrifuge (Kubota 5900; Kubota Co.). The protocol for APRP preparation was optimized by centrifuging peripheral blood at 230 - 270xg for 10 minutes. For the second stage, an acceleration of 2300xg was used for 10 minutes [14]. The American Association of Blood Banks (AABB) guidelines recommend 21-240C for blood centrifugation when receiving PRP [15]. For our studies, blood sampling from the ear vein of rabbits was carried out into 3 ml ependorf tubes with EDTA (13x75 mm) manufactured by Huma Tube K3-EDTA (Germany). An injectable form of platelet-rich plasma (PRP) was obtained by double centrifugation of autologous blood for 10 minutes on a tabletop centrifuge TDZ4-4Ws (China) according to the protocol proposed by J. Araki et al. [15]. At a temperature of 220°C, the acceleration of the first centrifugation of peripheral blood was carried out at 250 xg, the second at 2300 xg for 10 minutes.

Using a two-stage centrifugation, during the first centrifugation, first erythrocytes were removed from the whole blood, as the heaviest cells and leukocytes (platelets remain in the supernatant), and then, during the second centrifugation, platelets were concentrated.

Immediately after the end of the centrifugation process, platelet-rich plasma (PRP) was transferred into a sterile container to avoid reverse diffusion of platelets. The PRP obtained in a volume of 1 ml was injected immediately at 0.2 ml at 5 points around the wound perimeter once every 2 days. The initial concentration of platelets in platelet-rich plasma averaged 590.58 ± 25.69 (109/L).

Clinical and laboratory studies of the peripheral blood of rabbits were carried out on a BC-3000 hematological analyzer (Mindray, P.R. China). According to a detailed blood test, the content of hemoglobin (g/l), erythrocytes (g/l), leukocytes (109/l), platelets in absolute numbers (109/l, rod-nuclear neutrophils (%), segmented-nuclear neutrophils (%), lymphocytes (109/l) and hematocrit (%).

Statistical studies were performed based on standard clinical guidelines. Quantitative data are presented as arithmetic mean (M) ± standard deviation (SD) for normal distributions and as median (Md) and quartiles (Q) or (SD) for other distributions. The level of reliability $P < 0.05$ was taken as statistically significant changes.

The clinical examination results were processed on a Pentium-IV personal computer using Microsoft Exell office software. Microsoft Access and programs on biostatistics STATPLUS (2009), with the calculation of the arithmetic mean of the studied indicator (M), its standard error (m), reliability indicators (P) and Student's test. This took into account the techniques, existing guidelines for statistical data processing in clinical and laboratory studies [16].

Analysis of literature sources confirmed that clinical blood test remains the most common laboratory method. Meanwhile, the potential clinical potential of this routine method for bone fractures has not been sufficiently explored. The information content of the leukocyte index of intoxication (LII), the index of the severity of intoxication (ISI), the hematological index of intoxication (GII) in patients with tumors of various localizations, inflammatory and purulent diseases of the lungs, abdominal organs, soft tissues has been reliably proved to determine the prognosis of their development and the severity of the course [17,18]. The clinical significance of these indicators lies in their determination as criteria that help, along with clinical data, to diagnose the progression of the process and the development of purulent complications. Matsevich D.I. and Lashkovsky V.V. (2020), note that the most common laboratory method remains a general blood test, the potential clinical possibilities of which in bone fractures are not sufficiently disclosed. Changes in the hematological indicators of intoxication in patients in the pre- and postoperative periods determine the level of resistance of the organism and, along with clinical data, allows to assess the progression of the process with the development of inflammatory and purulent-destructive complications. LII and GII indices exceeding their normal values leads to the development of endogenous intoxication (EI) associated with damage to the bone and surrounding soft tissues, with the development of inflammation in the damaged area, which reduces the body's resistance to bacterial infection. On the 3 day, EI decreases due to the removal of damage products from the body. Therefore, if hematological indices do not decrease by the third day to the normal range, there is a risk of developing infectious complications during subsequent treatment [18]. So, the results obtained by us when studying the dynamics of hematological parameters of peripheral blood showed that on the 7th day of experiments, the hemoglobin content decreases in group 3 after administration of APRP to 155.33 ± 3.74, in experimental group 2 to 152.17 ± 4,88

with control values 159.17 ± 4.56 g/l (Table 1). On the 14th, 30th and 60th days of experiments in rabbits of the 3 group receiving APRP-therapy, the hemoglobin content remains at the level of the initial and control values, which makes it possible to state the effectiveness of the application of APRP-treatment in bone fractures.

The concentration of erythrocytes on the 7th day in groups 2, 3 and control 4.22 ± 0.09, 4.55 ± 0.05 and 4.73 ± 0.07 g/l, respectively, is almost at the same level. On days 14, 30 and 60, in group 2, a decrease in the content of hemoglobin and erythrocytes progresses, the minimum values of indicators were set on day 60. It should be noted that on the 60th day, the values of the studied indicators are lower than the initial and control levels compared with 7 days, the stabilization of the levels of indicators was noted on the 90th day. Consequently, in animals of group 2 that did not receive treatment in the postoperative period, the level of body resistance is low even on the 60th day.

On the 7th day of experiments, the average number of leukocytes in group 2 7.05 ± 0.17x109/l exceeds the indicators in group 3 (6.80 ± 0.07) by 0.25 times and control values by 0.77 times (6.28±0.22). When studying such types of leukocytes as lymphocytes and neutrophils, an increase in lymphocytes in rabbits of group 2 up to 50.83 ± 2.27x109/l, in group 3 up to 49.33 ±1.78 compared with control, 47.33 ± 2.39, was established. There is also a tendency towards an increase in the values of stab and segmented neutrophils. When analyzing the quantitative ratio between individual forms of leukocytes, it was revealed that more than 85% are segmented neutrophils and lymphocytes. On days 14, 30, 60 and 90 in group 2 without treatment, an increase in the content of lymphocytes and neutrophils progresses, the maximum values of indicators were set on days 30 and 60. It should be noted that on the 60th day, the values of the indicators exceed the initial and control levels of 7 days, which indicates a low level of resistance of the organism of the animals of group 2 that did not receive treatment in the postoperative period. A different dynamics can be traced in animals of 3 groups receiving APRP-treatment. So, starting from the 14th day of therapy, the content of lymphocytes and neutrophils is stabilized. On the 7th day of experiments, the average number of leukocytes in group 2 7.05 ± 0.17x109/l exceeds the indicators in group 3 (6.80 ± 0.07) by 0.25 times and control values by 0.77 times (6.28±0.22). When studying such types of leukocytes as lymphocytes and neutrophils, an increase in lymphocytes in rabbits of group 2 up to 50.83 ± 2.27x109/l, in group 3 up to 49.33±1.78 compared with control, 47.33±2.39, was established. There is also a tendency towards an increase in the values of stab and segmented neutrophils. When analyzing the quantitative ratio between individual forms of leukocytes, it was revealed that more than 85% are segmented neutrophils and lymphocytes. On days 14, 30, 60 and 90 in group 2 without treatment, an increase in the content of lymphocytes and neutrophils progresses, the maximum values of indicators were set on days 30 and 60. It should be noted that on the 60th day, the values of the indicators exceed the initial and control levels of 7 days, which indicates a low level of resistance of the organism of the animals of group 2 that did not receive treatment in the postoperative period. A different dynamics can be traced in animals of 3 groups receiving APRP-treatment. So, starting from the 14th day of therapy, the content of lymphocytes and neutrophils is stabilized.

Erythrocyte sedimentation rate values in rabbits of the 2nd group at the level of 6.50±0.22 mm/sec exceeded the indicators of the 3rd group (6.00 ± 0.27) and control (4.5 ± 0.67) by 1.3 times. The studied hematological parameters in animals of the 2nd group did not reach the control values even on the 90th day. The opposite dynamics was revealed in relation to hematological parameters in animals in group 3, which were prescribed APRP-treatment. Thus, it was found that all the studied indicators reached their initial values by the end of 14 days of the experiments (Table 1). The results of our research are similar in direction but less pronounced with the results of clinical and laboratory studies obtained by A.P. Vlasov. et al. (2012). The

Table 1

Results of hematological studies of rabbit peripheral blood (M±m)

Observation groups	1 group, control	Group 2, no treatment	Group 3, APRP-therapy
7 DAYS			
Erythro-cyte sedimen-tation rate (ESR), мм/час	4,5±0,67	6,50±0.22	6,00±0,26
Average conce-ntrationof hemo-globin in erythro-cyte, g / l MCHC	366,23±0,49	362,50±1,07	364,41±0,96
Hematocrit, % HCT	36,97±0,33	37,48±0,34	37,01±0,23
Lympho-cytes,10 9 / l,	47,33±2,39	50,83±2,27	49,33±1,78
Seg-mental-nuclear neutro-phils, %	38,17±1,51	39,83±1,70	39,33±1,45
Rod-nuclear neutro-phils,%	2,50±0,224	3,67±0,21	3,50±0,22
Platelets in absolute numbers, 109 / l	233,00±6,55	243,83±6,54	243,50±5,73
Leuko-cytes, 109 / lWBC	6,28±0,22	7,05±0,17	6,80±0,07
Erythro-cytes, g / l RBC	4,73±0,07	4,22±0,09	4,55±0,06
Hemoglobin, g / l	159,17±4,56	152,17±4,88	155,33±3,74
14 DAYS			
Erythro-cyte sedimen-tation rate (ESR), мм/час	7,00±0,01	6,50±0,22	6,00±0,26
Average conce-ntrationof hemo-globin in erythro-cyte, g / l MCHC	358,40±5,62	362,50±1,07	364,42±0,99
Hematocrit, % HCT	36,84±0,34	37,48±0,34	36,81±0,25
Lympho-cytes,10 9 / l,	57,50±1,67	50,83±2,27	48,00±1,29
Seg-mental-nuclear neutro-phils, %	41,00±1,65	39,83±1,70	38,33±0,71
Rod-nuclear neutro-phils,%	4,50±0,224	3,67±0,21	3,17±0,17
Platelets in absolute numbers, 109 / l	255,33±3,14	243,83±6,54	236,50±5,17
Leuko-cytes, 109 / lWBC	8,10±0,20	7,05±0,17	6,48±0,06
Erythro-cytes, g / l RBC	4,08±0,08	4,22±0,09	4,70±0,05
Hemoglobin, g / l	149,67±3,76	152,17±4,88	157,83±2,17
30 DAYS			
Erythro-cyte sedimen-tation rate (ESR), мм/час	8,00±0,26	6,50±0,22	5,00±0,01
Average conce-ntrationof hemo-globin in erythro-cyte, g / l MCHC	357,95±5,45	362,50±1,07	366,00±0,59
Hematocrit, % HCT	36,50±0,32	37,48±0,34	37,01±0,21
Lympho-cytes,10 9 / l,	59,17±1,046	50,83±2,27	47,17±1,30
Seg-mental-nuclear neutro-phils, %	45,00±2,16	39,83±1,70	38,00±0,45
Rod-nuclear neutro-phils,%	5,00±0,26	3,67±0,21	3,00±0,001
Platelets in absolute numbers, 109 / l	260,33±0,80	243,83±6,54	236,50±5,17
Leuko-cytes, 109 / lWBC	8,60±0,23	7,05±0,17	6,52±0,05
Erythro-cytes, g / l RBC	4,00±0,06	4,22±0,09	5,00±0,07
Hemoglobin, g / l	148,50±3,82	152,17±4,88	159,00±1,86
60 DAYS			
Erythro-cyte sedimen-tation rate (ESR), мм/час	8,0±0,26	6,50±0,22	5,00±0,01
Average conce-ntrationof hemo-globin in erythro-cyte, g / l MCHC	347,44±2,83	362,50±1,07	366,03±0,55
Hematocrit, % HCT	35,38±0,32	37,48±0,34	37,01±0,21
Lympho-cytes,10 9 / l,	61,33±0,67	50,83±2,27	47,17±1,30
Seg-mental-nuclear neutro-phils, %	50,67±1,98	39,83±1,70	38,00±0,45
Rod-nuclear neutro-phils,%	6,67±0,21	3,67±0,21	3,00±0,01
Platelets in absolute numbers, 109 / l	262,33±0,84	243,83±6,54	236,50±5,17
Leuko-cytes, 109 / lWBC	9,13±0,18	7,05±0,17	6,52±0,05
Erythro-cytes, g / l RBC	3,57±0,11	4,22±0,09	5,00±0,07
Hemoglobin, g / l	146,67±3,33	152,17±4,88	159,00±1,90
90 DAYS			
Erythro-cyte sedimen-tation rate (ESR), мм/час	8,0±0,26	6,50±0,22	5,0±0,01
Average conce-ntrationof hemo-globin in erythro-cyte, g / l MCHC	368,81±3,98	362,50±1,07	366,03±0,55
Hematocrit, % HCT	37,17±0,24	37,48±0,34	37,01±0,21
Lympho-cytes,10 9 / l,	50,00±1,77	50,83±2,27	47,17±1,30
Seg-mental-nuclear neutro-phils, %	38,83±1,35	39,83±1,70	38,00±0,45
Rod-nuclear neutro-phils,%	3,83±0,31	3,67±0,21	3,00±0,01
Platelets in absolute numbers, 109 / l	242,00±3,47	243,83±6,54	236,50±5,17
Leuko-cytes, 109 / lWBC	6,97±0,33	7,05±0,17	6,52±0,05
Erythro-cytes, g / l RBC	5,03±0,10	4,22±0,09	5,00±0,07
Hemoglobin, g / l	153,0±1,89	152,17±4,88	159,0±1,86

authors' studies have shown that patients with long tubular bones fractures experienced significant homeostasis disorders, and noticeable deviations of homeostatic constants were noted upon admission to the clinic. Clinical studies have shown that in patients with fractures of long tubular bones the first three days after the operation, the number of leukocytes and segmented neutrophils in the general blood test was significantly increased, respectively, by 45.96 and 18.51%, on days 5-7 - by 61.92 and 23.03% and on the 10th day - by 39.74 and 9.34%. Within 7 days, a significant increase in stab neutrophils was recorded. The erythrocyte sedimentation rate was 3.07–3.87 times higher than normal ($p < 0.05$) [19]. Thus, the number of erythrocytes, hemoglobin, leukocytes in the posttraumatic period did not have statistically significant differences. Leukocytosis in rabbits of group 2, who were not prescribed APPR-therapy, is associated with an increase in the number of neutrophils and lymphocytes caused by an inflammatory response to the experimental bone fracture. The study of the leukocyte formula showed an increase in platelets in absolute numbers. The study of platelet count is important for determining the hemodynamic changes observed in bone fractures. The blood circulating in the bloodstream in case of violation of the integrity of the blood vessel wall due to trauma undergoes changes, in the coagulation system a system that regulates the aggregate state of blood is triggered. This regulation is carried out by mechanisms with the participation of factors of the coagulation and anti-coagulation and fibrinolytic systems. In the event of a bone fracture, a violation of the functional relationships of interacting systems can lead to pathological conditions dangerous for the body (bleeding or intravascular thrombus formation) [20].

The results of the studies have shown that the hemostasis system suffers throughout the observation period in animals of group 2. According to the data summarized in table. 1, laboratory parameters of hemostasis in rabbits of groups 2 and 3 revealed an increase in the number of platelets. So, in comparison with the control indicators, the number of platelets on the 7th day of experiments in individuals of group 2 increases by 1.05%, on the 14th day by 9.58%, on the 30th day - by 11.7%, on the 60th day - 12, 58%, on day 90 - by 3.86%.

In animals of the 3rd group, who received APRP-treatment, on the 7th day of the experiments in comparison with the control values, the number of platelets increased by 4.51%, on the 14-90 days - by 1.50%, however, compared with the initial values on the 7th day, the dynamics of a decrease in the number of platelets by 4.5%, on days 14-90 - by 1.5%, which indicates a positive dynamics of the process.

Thus, the results allow us to state that in rabbits of group 2, which did not receive APRP therapy, the number of platelets increased during all periods of observation, which can be explained by their massive release from the depot.

Output. Comparative analysis of the results of hematological markers in the blood of rabbits made it possible to state that the indices in group 3 with APRP treatment are similar to those in the control group.

Conclusion. Hematological parameters in animals of group 2 reached control values on day 90. In animals of the 3rd group, who received APRP -therapy, all indicators reached their initial values by the end of 14 days of the experiments. Platelet-rich plasma (PRP) to stimulate reparative osteogenesis is an inexpensive, simple and effective procedure. The possibilities of using this technology in traumatology and orthopedics require further research to draw up optimal protocols for using APRP therapy to stimulate the formation of callus.

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EVALUATION OF THE EFFECTIVENESS OF IMMUNOMODULIN IN CHILDREN WITH ACUTE OBSTRUCTIVE BRONCHITIS AND BRONCHIOLITIS

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Key words: bronchitis and bronchiolitis, immunomodulin, treatment, children.

ОЦЕНКА ЭФФЕКТИВНОСТИ ИММУНОМОДУЛИНА У ДЕТЕЙ С ОСТРЫМИ ОБСТРУКТИВНЫМИ БРОНХИТАМИ И БРОНХИОЛИТАМИ

Мухсинова М. Х.

Ключевые слова: бронхиты и бронхиолиты, иммуномодулин, лечение, дети.

В данной статье приведены особенности течения острых обструктивных бронхитов и бронхиолитов у детей раннего возраста, а также данные по обоснованию включения препарата иммуномодулин в комплекс лечебных мероприятий больным детям, как для оптимизации терапии, так и для профилактики тяжелых осложнений. Эффективность проведённой терапии оценивали по клиническим данным и сроку исчезновения симптомов дыхательной недостаточности и интоксикации у детей в период лечения.

ЎТКИР ОБСТРУКТИВ БРОНХИТ ВА БРОНХИОЛИТ БИЛАН КАСАЛЛАНГАН БОЛАЛАРДА ИММУНОМОДУЛИН САМАРАДОРЛИГИНИ БАҲОЛАШ

Мухсинова М. Х.

Калит сўзлар: бронхитлар ва бронхиолитлар, иммуномодулин, даво, болалар.

Ушбу мақолада эрта ёшдаги болаларда ўткир обструктив бронхит ва бронхиолит касалликларининг кечиши бахоланиб, бемор болаларни даволаш комплексига касалликнинг огир асоратларини олдини олиш максадида иммуномодулин дори воситасини киритиши таърифи ва асосланиши тўғрисида маълумотлар келтирилган. Иммуномодулин препаратининг самарадорлиги даволаниш даврида болаларда клиник белгилар хамда нафас етишмовчилиги ва интоксикация белгилари йўқолган даври билан баҳоланади.

Currently, bronchitis, in the Republic of Uzbekistan, remains one of the main pathologies in the structure of lesions of the lower respiratory tract, especially in children early age [1, 2]. In this case, the leading place among bronchitis is occupied by acute obstructive bronchitis and bronchiolitis, which are characterized by a tendency for repeated episodes of exacerbation and the development of severe complications, as well as a recurrent course [5, 6].

It is important to note that in recent years, certain number of successes have been achieved in the study of the etiology, pathogenesis, clinical picture, diagnosis, treatment of acute obstructive bronchitis and bronchiolitis [3, 4]. At the same time, as shown by the clinical experience of practical pediatricians, on whom the timely diagnosis of the disease largely depends, the appointment of adequate pharmacotherapy, the individual prevention of relapses is largely complicated due to the insufficient number of pathogenetically justified means of treatment [9,10] ... Drug immunomodulin is studied insufficiently, especially in acute obstructive bronchitis and bronchiolitis in children of early age [7, 8].

Material and methods.

Studies were carried out, that provided information on the definition and justification of the inclusion of immunomodulin in the complex of therapeutic measures for sick children of early age with acute obstructive bronchitis and bronchiolitis.

The effectiveness of the drug immunomodulin was assessed by the period (days) of the disappearance of symptoms of respiratory failure and intoxication in children during the period of treatment. Objective symptoms of respiratory failure in the clinical picture in children with acute obstructive bronchitis and bronchiolitis were severe shortness of breath with the participation of auxiliary muscles in the act of breathing and swelling of the nasal wings, cyanosis of the nasolabial triangle, high respiratory rate, pallor of the skin, tachycardia, prolonged expiration, distant rales.

Objective symptoms of body intoxication in children with acute obstructive bronchitis and bronchiolitis during the treatment period were high body temperature, lethargy, weakness, moodiness and anxiety, sleep disturbance, poor appetite, catarrhal phenomena (rhinitis, pharyngitis, rhinopharyngitis), leukopenia, neutrophilia, increased ESR.

It should be noted that the severity of sick children with acute obstructive bronchiolitis by clinical signs was significantly higher than in children with acute obstructive bronchitis, which required more intensive therapy with the inclusion of not only bronchodilators, sedatives, but also significantly more mucolytic drugs, as well as in some cases, antibiotics, glucocorticoid hormones (IV in a short course for 3-5 days).

Results and discussion.

The difference in therapy between patients with acute obstructive bronchitis and acute obstructive bronchiolitis is noted in the following examples.

Patient A., 8 months old. He fell ill acutely: his body temperature quickly rose to 38.5 °C, difficulty in nasal breathing appeared, and there was a single vomiting during the day. On the 2nd day,