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INDICATORS OF SYSTEM OF HEMOSTASIS IN CHILDREN OF EARLY AGE WITH PURULENT INFLAMMATORY DISEASES OF MAXILLOFACIAL AREA COMBINED WITH ANAEMIA

Summary. Indicators of system of hemostasis in 20 children with diffuse pyoinflammatory diseases (5 — inflammatory infiltrate, 7 — phlegmons of maxillofacial area, 8 — phlegmon of 2–3 areas) of maxillofacial area with anaemia are investigated. The role of chronometric, structural hypercoagulative syndrome and fibrinogen consumption coagulopathy in development of hypercoagulative stage DIC-syndrome is evaluated. It is noted that in children with diffuse phlegmon of maxillofacial area and intestine dysbacteriosis, anaemia of average degree develops. Including antithrombotic agents in complex therapy of diffuse pyoinflammatory diseases is scientifically proved.

Key words: pyoinflammatory diseases of maxillofacial area, anaemia, hemostasis.

The problem of treatment of sick children of early age with diffuse phlegmon of maxillofacial area becomes more and more significant [4, 8, 9]. The problem urgency is defined not only frequency not odontogenous inflammatory disease in children, but also change last years clinical current of torpently current processes caused by the somatic status of organism [7–9]. The interrelation between expression of premorbid burdeness and gravity of current phlegmon of maxillofacial area is noted. Quite often general signs of disease prevail over local symptoms, especially it is shown in patients of younger age when diffuse purulent process of maxillofacial area is combined with anaemia [5, 10].

In this connection there was necessity of studying of features of current extensive purulent processes of maxillofacial area in children сочетанной with anaemia. As it is known, the system hemostasis actively reacts to various exogenous and endogenous influences and in particular on pyoinflammatory processes [1, 7, 8]. In the literature there are individual publications on this question that testifies to obscurity of disturbances in system of hemostasis in children with purulent-inflammatory diseases of maxillofacial area with anaemia [4, 7, 8].

So the objective of our work was to study indicators of system of hemostasis in children with pyoinflammatory diseases of maxillofacial area with anaemia.

Materials and Methods

For the decision of object in view we carry investigation of 20 children with phlegmon of maxillofacial area of several anatomic areas (submandibular, buccal and parotic spaces) with anaemia of average degree (haemoglobin level 80–90 g/l) age from 1 till 3 years [1, 3, 9]. Patients arrived in clinic late, for 7–10 days from the disease beginning. In all patients to

day of entering in hospital were spent common inspections with blood and urine analyses. Indicators of system of hemostasis [2, 10] in sick children studied prior to the beginning of antibacterial therapy and surgical intervention, for 7 and 14 days. With all patients in day of hospitalization under anaesthetic opened suppurative focuses, washed out wound solutions of antiseptics and drained. Complex drug treatment was spent traditionally by appointment — the antibiotics, desensitizing preparations of disintoxication, symptomatic, fortifying therapy. The received results are processed by method of variation statistics with use of package of applied programs for IBM PC AT.

Results

Results of research submitted in Table 1. In pyoinflammatory diseases of maxillofacial area with anaemia of average degree (90.60 ± 1.95 g/l haemoglobin) along with depression quantity of erythrocytes to $8.2 \pm 4.4 \times 10^{12}/l$ is observed augmentation of quantity of leucocytes to $20.00 \pm 0.54 \cdot 10^9/l$ that specifies in active phase of inflammation. The augmentation of blood sedimentation rate to 28.40 ± 0.45 mm/h is thus noted. It is necessary to notice augmentation of quantity of band neutrophils in surveyed children to sizes — 10.00 ± 0.11 % that specifies in endogenous intoxication and exit in blood channel of young forms of neutrophils. In the present state of affairs the quantity of lymphocytes decreases to value — 30.50 ± 1.49 %. The analysis of the received results against traditional therapy and surgical interventions

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has shown that for 14 days of research indicators of haemoglobin of blood in surveyed children the quantity of erythrocytes on 8.7 % rather to the initial data that specifies in adequacy of spent therapy goes down on 9.09 %.

Thus, the quantity of leucocytes is on value of $12.50 \pm 0.55 \cdot 10^9/l$ that specifies in conservation of inflammatory process. Degree of endogenous intoxication, that is indicator of band neutrophils decreases in 2 times in comparison with initial indicators. On the contrary, in these investigated terms it is noticed risings of macrophages, in particular monocytes to size 5.00 ± 0.19 % that specifies in activation of autoimmune process caused by entering in blood channel of the blasted cells and its membranous structures.

It is known that one of factors of protective system of organism is the hemostasis system. The researches spent by us (Table 2) have shown that in children with pyoinflammatory diseases of maxillofacial area combined with anaemia at entering note appreciable change of indicators of hemostasis: the number of thrombocytes has decreased for 31.9 %, and hematocrit indicators on 27.1 %; indicators of the activated recalcification time (ART) has decreased on 45.1 % and activated partial thromboplastin time (APTT) on 44.5 %. Along with it reduction of quantity of prothrombin by 17.2 % and fibrinogen on 28.8 % is noted; time of retraction of clots has increased on 80 % and fibrinolytic activity was enlarged by 60 %, L-L factor indicators on 37.2 %, and fibrin stabilizing factor on 32.6 %. Depression of indicator of tolerance of plasma to heparin on 27.7 % is established. The analysis aggregation specifies to activity of thrombocytes in reduction of indicators of the second and sixth dilution on 34.2 and 37.57 %, respectively.

For 7 days after the spent treatment indicators hemostasiogramma in comparison with the initial data have slightly changed towards control indicator. The indicators of system of hemostasis investigated on 14 days have changed in positive side concerning the initial data: the quantity of thrombocytes concerning the initial was enlarged by 9.5 %. Indicators ART and APTT remained low, 26.68 and 29.9 %, respectively, compared to controls. The prothrombin ratio rather to initial level was enlarged by 9.56 %, fibrinolytic activity of

system of hemostasis remains authentically high. The indicator of tolerance of plasma to heparin for 21 days of research has changed concerning the initial data in positive side.

In children with pyoinflammatory diseases of maxillofacial area combined with anaemia quantity of thrombocytes of the blood, activated partially thromboplastin time, the activated calcium clotting time have been authentically lowered that testifies to rising of activity of external and internal coagulative link of system of hemostasis. In children with pyoinflammatory diseases of maxillofacial area against anaemia proceeding with high endogenous intoxication (LII-5) [1, 4, 7, 9], after the spent therapy in procoagulant, fibrinolytic and platelet links of system of hemostasis changes the last expressed in activation are noted. Thus disturbance of vascular link of system of hemostasis keeps risk on thrombophilic the complications caused by low level of natural anticoagulant and low indicator of fibrinogen. The obtained data convincingly confirms development of chronometric and structural hypercoagulation, hyperactivity of thrombocytes, disturbance of properties of bloody clot and fibrinogen consumption coagulopathy. This condition under the literary data [1, 2, 9, 10] is considered the first stage DIC of syndrome. Against depression thromboresistance endothelium of microvessels owing to entering in blood flow of considerable quantity of thromboplastin from tissues (damaged by inflammatory process and under the influence of hypoxia), sharply amplifies formations of thrombinum and develops hypercoagulation. The second stage proceeds with accelerated thromboplastinopoiesis reaction. Thus decrease concentration fibrinogen, the maintenance of thrombocytes, compensatory increase of anticoagulatory and fibrinolytic activity becomes perceptible. For diagnostics great value hyperthermia signs (pallor of skin or hyperemia, Crocq's disease, arterial hypertension, tachycardia, oliguria, compensated can have metabolic acidosis, fever to 39–40.5 °C). Occurrence of syndrome DIC in children with diffuse phlegmon of maxillofacial area against anaemia testifies to diffusive current of disease and thrombotic conditions with presence of high risk of occurrence of clottages and thromboembolisms in zone of lesion and expansion of zone of necrosis of tissues.

Table 1. Indicators of the general analysis of blood in children with diffuse phlegmon of maxillofacial area with anaemia in dynamics of treatment

Indicators of the general analysis of blood	Norm (3-year) SI	Before surgery at admission	14 days after surgery
Haemoglobin (g/l)	110	90.60 ± 1.95	82.40 ± 4.48*
Erythrocytes ($\cdot 10^{12}/l$)	3.9–4.4	3.10 ± 0.08	2.70 ± 0.17 *
Colour index	0.85–1.0	0.83 ± 0.01	0.81 ± 0.02*
Leucocytes ($\cdot 10^9/l$)	4–9	20.00 ± 0.54	12.50 ± 0.55*
Band (%)	1–6	10.00 ± 0.11	6.00 ± 0.28*
Segmented (%)	47–55	62.40 ± 1.24	50.00 ± 1.88*
Eosinophils (%)	0.5–5	2.50 ± 0.18	1.00 ± 0.33*
Lymphocytes (%)	41–55	30.50 ± 1.49	41.80 ± 1.27*
Monocytes (%)	3–11	1.20 ± 0.09	5.00 ± 0.19*
ESR (mm/h)	2–10	28.40 ± 0.45	14.50 ± 0.45*

Note: * — $P < 0.05$, compared with data before treatment.

Discussion

Current of acute inflammatory processes of maxillofacial area is accompanied by disintegration of endotoxins and intoxication, which lead to dysbacteriosis condition in intestine [4, 7–9]. In intestine dysbacteriosis there is activation of neutrophils and emission of paved mediators of system inflammation — cytokines, and others [3, 4]. This circumstance aggravates blood perfusion through organs and their functionality. Cytokines — biological active substances allocated with cells of monocyte-macrophage system and lymphocytes. The anaemia in acute and chronic inflammatory diseases of maxillofacial area is result of action of proinflammatory cytokines: the TNF, IL-1, interferon beta and interferon scale [1, 4, 6]. All of them oppress erythropoiesis [4, 5]. The TNF and interferon бера appear in bacterial infections (aerobic and anaerobic), and IL-1 and interferon scale — in chronic inflammatory diseases chronic plural periodontitis). In both cases these cytokines are capable to suppress proliferation of cells of erythroidal sprout, development of erythropoietin by kidneys and liberation of iron from macrophages. Cytokines operate quickly and very effectively. In acute bacteriemic infection easy anaemia (concentration of haemoglobin 90–100 g/l) can already develop in the first 24–48 h [1, 4–6]. At first concentration of haemoglobin falls owing to short-term, independently stopping hemolysis when macrophages quickly delete the become obsolete erythrocytes from blood. Anaemia conservation in the subsequent some days or weeks reflects oppression of erythropoiesis by cytokines.

Thus the anaemia from easy degree (Table 1) passes to 57 day of disease in medium degree. Under biochemical analyses rising of indicator of bilirubin is in parallel observed. Development of iron deficiency anaemia against lowered production stomach juice and acidum hydrochloricum (owing

to bad food and disease development), and also disturbances of microflora of intestine is thus accelerated: transformation process oxide gland in ferrous is thus braked, is sharp inhibited iron absorption in duodenum and other departments of small bowel. Assimilation of iron and in those cases when in intestine it is bridged to calcium and phosphorus preparations, forming with them insoluble bonds which are not soaked up in intestine considerably decreases. In traditional treatment indicators of the general analysis of blood in children with adenophlegmon of maxillofacial area with anaemia for 14 days of treatment despite clinical recover have changed concerning the initial data in positive side slightly. The anaemia of average degree has remained. For 14 days of treatment in children delicacy, appetite disturbance, dysbacteriosis condition (the first degree) and enlarged local lymph nodes have partially remained. Criteria of the general treatment of sick children were: improvement of the general and local clinical signs, rapprochements of the basic indicators of clinic — laboratory researches to norm. In three patients with phlegmonous adenitis of maxillofacial area with anaemia there has come necrosis of soft tissues of cervical and parotic area and subsequently defect of tissue was formed.

Conclusions

1. In children with pyoinflammatory diseases of maxillofacial combined with anaemia reactance of thrombocytes raises and develops thrombolytic conditions.

2. Children with pyoinflammatory diseases of maxillofacial area against anaemia are characterized by nonspecific changes in cellular and plasma components of system of the hemostasis which essence consists in augmentation of functional activity of thrombocytes.

Table 2. Indicators of system of hemostasis in children with not dontogenous phlegmon of maxillofacial area combined with anaemia in dynamics of comparison

Indicators	Healthy children (n = 14)	Compared with tradition therapies (n = 20)		
		Before surgery at admission	7 days after surgery	14 days after surgery
Platelet count ($\cdot 10^9/l$)	260.0 \pm 10.5	177.0 \pm 11.5*	181.6 \pm 14.3**	199.0 \pm 12.8**
Haematokrit number (%)	37	27*	30**	32**
Activated calcium clotting time (s)	62.1 \pm 2.4	34.1 \pm 3.1*	39.2 \pm 4.1**	43.2 \pm 2.8**
Activated partial thromboplastin time (s)	38.6 \pm 1.1	21.4 \pm 3.2*	23.3 \pm 2.6**	27.8 \pm 2.1**
Prothrombin ratio (%)	88.5 \pm 4.4	73.2 \pm 6.1*	76.4 \pm 5.2**	80.2 \pm 2.3**
Fibrinogen (g/l)	2.81 \pm 0.25	2.00 \pm 0.31*	2.20 \pm 0.34**	2.50 \pm 0.47**
Clot retraction	0.40 \pm 0.03	0.72 \pm 0.03	0.60 \pm 0.02**	0.51 \pm 0.03**
Fibrinolytic activity (g/l)	1.0 \pm 0.2	1.60 \pm 0.12*	1.005 \pm 0.080**	1.30 \pm 0.07**
L-L factor (s)	72.4 \pm 3.8	99.2 \pm 4.1*	96.4 \pm 3.4**	90.3 \pm 3.6**
Fibrin stabilizing factor (%)	95.0 \pm 3.5	126.2 \pm 4.3*	121.5 \pm 3.5**	112.2 \pm 4.0**
Tolerance of plasma to heparin (min)	8.3 \pm 0.5	6.0 \pm 1.1*	6.9 \pm 0.9**	7.5 \pm 1.2**
Hemolysate aggregation test (II dilution) (s)	14.0 \pm 0.8	9.2.0 \pm 0.3*	10.7 \pm 0.7**	12.1 \pm 0.2**
Hemolysate aggregation test (VI dilution) (s)	34.6 \pm 2.1	21.6 \pm 0.4*	24.0 \pm 0.8**	27.9 \pm 0.8**

Notes: * — $p < 0.05$ in comparison with group of healthy children; ** — $p < 0.05$ in comparison with data before operation.

3. In children of early age with phlegmon of maxillofacial area against anaemia occurrence of condition of chronometric and structural hypercoagulation and coagulopathy consumption of fibrinogen, which in the subsequent can pass in the first stage DIC-syndrome, is characteristic.

4. Children in development of diffuse pyoinflammatory diseases of maxillofacial area and intestine dysbacteriosis have activation of neutrophils and emission of paved mediators of system inflammation — cytokines which oppress erythropoiesis and cause developments of anaemia of average degree.

5. In children with phlegmon of maxillofacial area against anaemia in hemostasis system decrease concentration fibrinogen, the maintenance of thrombocytes, compensatory increase of anticoagulatory and fibrinolytic activity becomes perceptible.

The received results of research have allowed not only to understand pathogenesis and pathophysiology changes in system of hemostasis of sick children with pyoinflammatory diseases of maxillofacial area combined with anaemia, but also scientifically to prove necessity of early including for pathogenetic therapy of inhibitors of function of thrombocytes, and also anticoagulants, for purposeful preventive maintenance of disturbances of coagulating system of the blood and necrosis of soft tissue of maxillofacial area.

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ПАРАМЕТРЫ СИСТЕМЫ ГЕМОСТАЗА У ДЕТЕЙ РАННЕГО ВОЗРАСТА С ГНОЙНО-ВОСПАЛИТЕЛЬНЫМИ ЗАБОЛЕВАНИЯМИ ЧЕЛЮСТНО-ЛИЦЕВОЙ ОБЛАСТИ, СОЧЕТАННЫМИ С АНЕМИЕЙ

Резюме. Исследованы показатели системы гемостаза у 20 детей с разлитыми гнойно-воспалительными заболеваниями (5 — с воспалительным инфильтратом, 7 — флегмонами челюстно-лицевой области, 8 — флегмонами 2–3 областей) челюстно-лицевой области, сочетанными с анемией. Оценена роль хронометрического, структурного гиперкоагуляционного синдрома и коагулопатии потребления фибриногена в развитии гиперкоагуляционной ста-

дии ДВС-синдрома. Отмечено, что у детей с разлитой флегмоной челюстно-лицевой области и дисбактериозом кишечника развивается анемия средней степени. Научно обосновано включение противотромботических средств в комплексную терапию разлитых гнойно-воспалительных заболеваний.

Ключевые слова: гнойно-воспалительные заболевания, челюстно-лицевая область, флегмона, анемия, гемостаз.

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ПАРАМЕТРИ СИСТЕМИ ГЕМОСТАЗУ В ДІТЕЙ РАНЬОГО ВІКУ З ГНІЙНО-ЗАПАЛЬНИМИ ЗАХВОРЮВАННЯМИ ЩЕЛЕПНО-ЛИЦЬОВОЇ ДІЛЯНКИ, ПОЄДНАНИМИ З АНЕМІЄЮ

Резюме. Досліджені показники системи гемостазу у 20 дітей із поширеними гнійно-запальними захворюваннями (5 — із запальним інфільтратом, 7 — флегмонами щелепно-лицьової ділянки, 8 — флегмонами 2–3 ділянок) щелепно-лицьової ділянки, поєднаними з анемією. Оцінена роль хронометричного, структурного гіперкоагуляційного синдрому й коагулопатії споживання фібриногену в розвитку гіперкоагуляційної стадії

ДВС-синдрому. Відзначено, що в дітей із поширеною флегмоною щелепно-лицьової ділянки і дисбактеріозом кишечника розвивається анемія середнього ступеня. Науково обґрунтоване включення протитромботичних засобів у комплексну терапію поширених гнійно-запальних захворювань.

Ключові слова: гнійно-запальні захворювання, щелепно-лицьова ділянка, флегмона, анемія, гемостаз.