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Condition lymphatic flow and composition of lymph and blood in surgical interventions

Abstract. From various sources, we know that the science of spermatologii studied at various farm animals. The composition and properties of surface plasma membrane glycolipids determine mitotic phase cell activity and cell division. Demonstrated their exceptional role in cell-cell interactions: in the phenomena of «recognition» of cells to each other, adhesion, differentiation, growth, proliferation, contact inhibition of growth. In this article, we were examined lymph, lymph and blood composition, such as the volume of blood plasma in rams against the backdrop of one of the oldest forms of non-specific defense response – inflammation caused by surgical injury. Experiments were carried out on 14 rams Altai Merino. After a clinical examination of the animals, quickly create lymph venous anastomosis between the thoracic duct and jugular vein on the previously developed modifications N. Myrzakhanova, 1980. To prevent the lymph and blood clotting heparin was injected intravenously. A sample of the lymph and blood for analysis were taken from the thoracic duct and jugular vein. Elastica Kastrati morning before and after the conference. Analysis of morphological composition of blood and bodies, and total protein was carried out by conventional methods in hematology and hematocrit using microcapillary. Studies have shown that after elastica Kastrati observed very excited animal. There was an increase in heart rate of 66 to 81 beats per minute and respiration of 16 to 28 breaths per minute. Increased body temperature to the upper limit of normal (before 39.90) and inhibition of motor-evacuation activity of the rumen from 3.5 to 1.2 beats per minute. These changes most evident the first 1-2 hours ($P < 0,01-0,001$), and then restored to the original values. Dynamics of white blood cells in the lymph and blood in this phase were determined not only the formation and release them in the lymph and circulatory changes depended on. This is evidenced by the decline in the value of lymph flow and hematocrit. Thus, reduction in the number of blood leukocytes Incoming defined reduction in lymph circulation on the one hand and an increase of the plasma volume with the other. Physiological assessment of the above leads to the conclusion that post-traumatic reaction at elastica Kastrati proceed fully and relatively easily transferred animals.

Key words Hemo-lymph circulation, elastica Kastrati, lymph flow, protective reaction, reproduction.

Introduction

Currently only a few works are devoted to the study of the most important representatives of complex compounds containing lipids [1; 2, P.106; 3, P.90; 4, P.51]. Meanwhile, phospholipids and cholesterol are major structural elements inside membranes of any cells, not just nerve as previously believed. The composition and properties of surface plasma membrane glycolipids determine mitotic phase cell activity and cell division. Their exceptional role has been demonstrated in cell-cell interactions: phenomena in «recognition» of cells with each other, adhesion, differentiation, growth, proliferation, contact inhibition of growth, and others [5, P.8; 6, P.51; 7, P.45; 8, P.93].

Biochemical aspects of solving the problem of artificial insemination has not only theoretical value, but also is the most promising direction in the development of objective criteria for evaluating the quality of iaciat, the usefulness and viability of sperma, the best uses of sperma of male pigs [9, P.160; 10, P.32], and other farm animals [11, P.150; 12, P.38] stronge and preservation of sperma, forecasting and maintaining high fertilizing capacity of sperma [13, P.76; 14, P.73].

The study of lymph circulation rheology for various violations gemo-lymph circulation is an actual problem of modern physiology. This implies relevant primarily from the fact that there are no violations of regional gemo-lymph circulation which would leave intact lymphatic system. On the other hand, the lymph

phatic system includes both non-specific mechanisms and specific defense of the organism. In this regard, the lymphatic system is evolutionarily the oldest, has a special role in ensuring and maintaining the stereotypical non-specific defense mechanisms. This is not only and not so much with the homeostatic function of the lymphatic system, but with the preservation of the dynamic balance of the internal environment, due to the movement of lymph – lymph-section [15, 16].

Materials and methods

Chronic experiments were performed on 14 young rams merino breed Altai six-month age-matched analogues principle. After a clinical examination of the animals surgically created lymph-venous anastomosis between the thoracic duct and jugular vein according to our earlier modification [17]. To prevent clotting of blood and lymph heparin intravenously injected at the rate of 1,500 units per 1 kg of animal body weight. Then, after one – two days, when the animals began to eat a full diet, started basic experiments. During the main experiment heparin was not performed. Surgery consisted of imposing animal rubber ring (elastica Kastrati) using special forceps at the base of the scrotum cervix (seven in animals) and in the same operation, but after infiltration anesthesia provisional neck scrotal tissue 100 ml of 0.5% novocaine solution (seven animals). A blood sample was taken for analysis of lymph from the breast duct and jugular vein in the morning before and after its elastica Kastrati of 1, 2, 3, 6, 24, 48, 72 and 96 hours. Analysis of the morphological structure of the lymph and blood and determination of the total protein level was carried out by conventional methods in hematology and hematocrit – using microcapillary. Of lymphatic thoracic duct measured in ml / min by collecting the lymph into a graduated test tube for 5 minutes.

Results

Studies have shown (Table 1), immediately after surgery, says very excited animal. This was manifested in increasing the duration of the active period of anxiety in an animal during the first hour (mean 49 minutes). Animals kicked, peering into the stomach, often lay down and immediately raised. There was an increase in heart rate of 66 to 81 beats per minute and breathing – from 16 to 28 breaths per minute, increase in body temperature to the upper limit of normal (up to 39.9⁰ C) and breaking the motor-evac-

uation function of the scar from 3.5 to 2.1 beats per minute. These changes most evident the first hours, and then restored to their original values. It should be noted that the rams, the neck of the scrotum which previously subjected to tight circulatory infiltration anesthetic Novocain, drastic changes in behavior and autonomic responses did not show, and found fluctuations in rates of cardiac activity, respiration and rumination were not significant and, as a rule, are not diversified.

Analysis showed a lymph and blood (Tables 2 and 3), circulatory and morphological changes in internal environments occur in two phases. In the first 1-3 hours after elastica Kastrati marked decrease in the rate of lymph flow from the thoracic duct, an average of 24.1% (P<0.01), decrease in hematocrit level (12.8%) and the total protein in the blood (5.2%) and lymph (2.4%). There was also reduction in the number of white blood cells in the lymph and blood (Table 2). This shift in the content of white blood cells in the lymph is due to eosinophils, monocytes, lymphocytes, and subsequently, while the blood was caused mainly due to lymphocytes. Dynamics of white blood cells in the lymph and blood in this phase were determined not only the formation and release them in the lymph and circulatory changes depended on. This is evidenced by a decrease Volume of lymph flow and the value of hematocrit.

Therefore, reducing the number of leukocytes in blood was determined by a reduction in revenue lymph circulation, on the one hand, and the increase of plasma volume of the other. An indirect confirmation of this is the fact that lymph plasma protein ratio remains constant in both immediate and long-term periods after elastica Kastrati, indicating the absence of significant changes in exchange transcapillary state. In the second phase, covering the period from 6 to 96 hours after elastica Kastrati, there was a general trend towards a clinical recovery (Table 1) and lymph hematological parameters (Table 2). However, it should be noted that the reduction in full circulatory link covers only post-surgical intervention, whereas cell responses from lymph and blood remain, indicating recovery processes of tissue homeostasis.

As can be seen from Table 2 lymph flow and the value of hematocrit differed little from the original background. The increase in white blood cells in the lymph occurred, mainly due to basophils, eosinophils and neutrophils, whereas similar changes in blood were relative to the background of the changing nature of the total number of leukocytes in it.

Table 1 – Clinical parameters in rams in the surgical intervention

Indicators	Before	1	2	3	6	24	48	72	96
The heart rate (min ⁻¹)	66	81	72	70	68	66	69	68	68
Respiratory rate (min ⁻¹)	16	28	22	20	18	16	17	18	18
Body temperature (°C)	38.5	39.9	39.9	38.6	38.6	39.0	38.8	38.6	38.6
ruminantion (min ⁻¹)	3.5	1.2	2.2	3.0	3.3	3.4	3.6	3.4	3.5

Table 2 – Condition lymph flow and composition of lymph and blood in rams during surgery

Indicators	Before	Hours, after surgical intervention							
		1	2	3	6	24	48	72	96
lymph flow thoracic lymphatic duct, ml/min of	3.3	2.7	2.4	2.4	3.3	3.3	3.0	3.0	3.2
leukocytes (10 ⁹ /L)									
lymph	16.9	13.6	10.6	20.1	24.6	25.6	23.4	23.1	20.9
blood	10.0	5.9	6.6	9.2	10.2	8.7	7.0	9.0	6.2
Leucoformula lymph(%)									
basophils	1.5	1.6	1.7	1.6	2.6	2.4	2.6	2.6	2.2
eosinophils	2.5	2.3	2.2	2.2	3.4	3.5	3.0	1.6	1.9
neutrophils	10.5	11.1	12.2	11.4	11.9	12.0	11.0	12.6	12.6
lymphocytes	84.5	84.5	83.8	84.3	81.8	81.7	83.0	82.8	82.8
monocytes	1.0	0.5	0.6	0.5	0.3	0.4	0.4	0.4	0.5
Leucoformula blood (%)									
basophils	0.7	0.9	1.1	1.2	1.9	1.3	1.0	1.0	1.0
eosinophils	7.0	6.8	6.8	6.9	8.0	8.2	8.4	6.6	6.9
neutrophils									
young	1.2	1.2	1.3	1.3	1.2	1.2	1.2	1.1	1.2
relating to stab	3.6	3.8	3.8	3.9	3.7	3.7	3.6	3.6	3.6
segmentonuclear	37.4	38.4	37.4	38.0	39.0	39.2	37.0	36.8	36.2
lymphocytes	49.0	45.9	46.6	45.8	43.4	43.6	45.0	48.0	48.2
monocytes	3.1	3.0	3.0	2.9	2.8	2.8	2.8	2.9	2.9
Hematocrit	42	38	36	36	40	40	41	40	40
Common blood protein (g\%)	5.98	5.86	5.78	5.68	5.98	6.02	6.02	6.02	5.98
Common lymph protein (g\%)	3.74	3.68	3.64	3.64	3.87	3.87	3.94	3.92	3.92
Lymph-plasma ratio of protein	0.64	0.62	0.63	0.64	0.64	0.65	0.64	0.65	0.65

The results of the study of lymph flow, the composition of lymph and blood, as well as some indicators lymph-gemodinamic in animals with pre-anesthesia neck scrotum Novocain solution showed that cellular and humoral changes in the lymph and blood of these animals were similar to those that have been found in animals which had not been held preliminary anesthesia of the cervix scrotal tissue (Tables 2 and 3), indicating that common mecha-

nisms of these reactions. The results show that when local disturbances lymph-gemo circulation (elastica Kastrati) there are complex changes in the lymph, plasma volume, the number and ratio of formed elements in the blood and lymph. As the evidence in the initial phase after surgery marked reduction in lymph flow, which appears to be associated with reflex humoral influences on the lymph vessels and nodes. The subsequent normalization of lymph flow

rate indicates re-adaptation lymph system and is aimed at restoring the initial state. In the first phase after surgery there is a decrease of leukocytes, primarily by monocytes and particularly lymphocytes, which are apparently also associated with reflex humoral influences. Thus, many researchers [18; 19] decrease for leukocytes found upon administration of corticosteroids and ACTH. In reducing, the number of lymphocytes in surgical trauma and sensitive denervation pointed out by other researchers [20; 21]. Studying the dynamics of white blood cells in the lymph and blood, especially their individual shapes in the second phase after surgery

showed a characteristic increase in the content of basophils, eosinophils and neutrophils. According to modern concepts [18] neutrophils are not only involved in phagocytosis, but also secrete a number of substances stimulating tissue regeneration, vascular permeability while the increase in eosinophils and basophils are interrelated, namely, increased production of histamine by basophils is accompanied by eosinophilia. Eosinophilia, in turn, regulate the levels of biogenic amines in the tissues and has antihistaminic activity [22]. Thus, it becomes more clear the role of these cells in lymph hemodynamic disorders in connection with surgical intervention.

Table 3 – Condition lymph flow and composition of lymph and blood in rams during surgical intervention after Novocain infiltration anesthesia

Indicators	Before	Hours, after surgical intervention							
		1	2	3	6	24	48	72	96
lymph flow of thoracic lymphatic duct, ml/min	3.2	2.7	2.5	2.5	3.0	3.2	3.1	3.2	3.2
leukocytes (10 ⁹ /L)									
lymph	16.8	14.4	13.8	13.0	18.0	21.0	22.0	21.0	20.2
blood	10.1	6.4	6.2	9.8	9.9	8.9	8.4	7.0	7.1
Leucoformula lymph(%)									
basophils	1.4	1.6	1.6	1.6	2.8	2.4	2.1	2.6	2.1
eosinophils	2.3	2.0	2.1	2.9	2.6	3.4	3.3	2.2	1.9
neutrophils	10.4	11.6	11.2	11.1	11.1	11.9	11	11.8	12.3
lymphocytes	84.0	84.1	84.5	84.7	81.8	84.7	83.0	82.9	83.3
monocytes	0.9	0.7	0.6	0.6	0.7	0.6	0.6	0.5	0.4
Leucoformula blood (%)									
basophils	0.7	0.9	0.9	1.1	1.7	1.4	1	1.1	0.9
eosinophils	7.1	7	6.9	7.1	7.2	7.8	8.1	7.1	7.0
neutrophils									
young	1.3	1.2	1.3	1.3	1.2	1.3	1.2	1.1	1.2
relating to stab	3.6	3.9	3.8	3.8	3.7	3.7	3.6	3.5	3.6
segmentonuclear	36.2	39.0	37.8	38.3	37.8	37.4	36.5	36.9	37.1
lymphocytes	47	45.1	45.4	45.4	45.4	45.5	46.6	47.2	47.2
monocytes	3.1	2.9	2.9	3.0	3.0	2.9	3.0	2.9	3.0
Hematocrit	42	37.0	38.0	37.0	39.0	39.0	41.0	41.5	42.0
Common blood protein (g%)	5.97	5.79	5.81	5.83	5.86	6.00	5.90	5.94	5.95
Common lymph protein (g%)	3.68	3.59	3.57	3.56	3.86	3.90	3.91	3.92	3.92
Lymph-plasma ratio of protein	0.62	0.62	0.62	0.61	0.66	0.65	0.66	0.66	0.66

It is known that these forms of leukocytes mainly produced in the bone marrow and enter the bloodstream [22]. Increasing their content in the lymph, apparently due to the passage of the formed elements in the lymph nodes at level [20].

Conclusion

Experiments have shown that after a preliminary infiltration circular anaesthesia neck scrotum Novocain reactions associated animal's behavior changes weaken or even disappear, revealing the unreliability shifts both somatic and autonomic (pulse, breath, rumination, temperature) the nature, whereas the shifts taking place in the lymph and blood, as well as the cellular responses to these shifts were similar to those which have been found in animals without an anesthetic procaine. These data agree with the definition of Sherrington: «Bodily pains have a mental addition to the protective reflex» [23]. let's take the idea that pain and certain manifestations of the protective reflex is a reaction to the signals of the same sensory apparatus and was found to later [24, p.78], pain receptors, nociceptors presented H-structures, whereas tissue receptors – interoreceptor presented M-structures [25,26,27,28]. Consequently, subliminal receptors of internal organs responsible for the formation of the vegetative level of regulation of the internal environment, whereas high-threshold afferents form appropriate behavior [29, 30]. Thus, in our experiments, both mechanisms occurred reflex-humoral regulation of protective reflexes. Physiological assessment of the above leads to the conclusion that post-surgical intervention takes place fully and relatively easily transferred animals in the case of the intensity of the blockade nociceptive component of the body's protective reflexes.

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