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Morphological Changes of Inguinal and Iliac Lymph Nodes with Modeling Tumor Process

ABSTRACT

Inguinal and iliac lymph nodes regional to a modeling tumor are investigated by methods of the light microscopy. With modeling of the neoplastic process some changes in inguinal lymph nodes connected with angiomegaly of cortical substance are noted. The hyperplasia of a cortical layer is regarded as a reflection of the antagonism of humoral and cellular immunity existing at certain stages of the tumor growth. The structural modifications in modeling of the experimental tumor are marked in a smaller degree in the iliac lymph nodes.

Keywords: lymph node, structure, tumor

INTRODUCTION

The annual increase in incidence and high mortality of patients from cancer of various localizations dictates the need of new effective methods of early diagnostics and treatment of malignant new growths, and also studying of the factors defining the course of oncological diseases and their outcome [4]. Tumoral process causes the morphological changes of regional lymph nodes to the tumor that is a reflection of organism's reaction in general [1,2]. The aim of this research was studying of features of the structural and cellular organization of inguinal and iliac lymph nodes when modeling tumoral process.

MATERIALS AND METHODS

The research experimental animal was outbred mice – males with the initial weight 17-20g. Animals were divided into two groups: 1) intact animals; 2) animals with tumor model. In each group there were 20 individuals, totally 40 animals. The experimental model of tumor was the hypodermic strain of Ehrlich tumor. Modeling of tumor was done by 0,1 ml ascitic liquid injection containing $3,0x10^{5}$ cells under skin of the external surface of the left hip of mice. The inguinal and iliac lymph nodes were taken as the objects of research. The animals of both groups were brought out of the experiment in 5 days after inoculation of tumor cells. All manipulations with animals were carried out under ether anesthesia. Lymph nodes were fixed in Telesnitsky's solution for 24 hours, dehydrated in a series of ethanol of the increasing concentration. Then the studied organs were concluded in paraffin blocks from which the serial cuts on the Reichert

microtome was done along a longitudinal axis of the organ. The cuts of 7-10 micrometers were prepared for a morphometry of structurally functional zones of lymph nodes, for the analysis of cellular structure of lymph nodes we prepared cuts of 7-10 micrometers, for the analysis of cellular structure of lymph nodes we prepared cuts of 3-5 micrometers thick. The histological cuts of inguinal and iliac lymph nodes done by Romanovsky's hematoxylin-eosin stain were studied by light microscope MBS-10 "Biolam". The principles of stereometry and method of imposing of dot morphometric grids have been applied to define the structural organization of lymph nodes. The grid test choice was considered sufficient if not less than 2 dots were the share of the structure occupying the smallest space of the cut. Imposing a grid we counted quantity of the dots which were dropping out on profiles of structures of the lymph node. The received quantity of dots was considered to a total dots of test system. We determined the area of all cut, the area of cortical and brain substance, a capsule, trabeculas, a regional sinus, primary and secondary lymphoid small knots, a cortical plateau and paracortical zone, corda medullaris and brain sinus in lymph nodes. We have counted a ratio of the specific area of cortical substance to the specific area of brain substance for lymph nodes in each experimental group. The cellular structure of lymph nodes was studied on cuts of thickness of 5 micrometers, 2 glemsa-stained slide. Lymphoblasts, average and small lymphocytes, macrophages, reticular cells, plasmablasts, plasmatic cells of different maturity level were differentiated in structurally functional zones of lymph nodes. The obtained data were processed by the method of variation statistics with a definition of average arithmetic, its mistake and confidential interval with reliability of R-95%.

RESULTS AND DISCUSSION

The results of our research testified that in the conditions of a normal lymph circulation the structure of inguinal and iliac lymph nodes was characterized by prevalence of cortical substance over the brain one. In the conditions of normal haemo-lymph circulation the difference of morphology inguinal and iliac lymph nodes consisted in prevalence of the relative sizes of a paracortical zone and cortical plateau in inguinal knot (17,86±0,13 and 20,17±0,98 respectively). The area of brain cords and sinuses in inguinal lymph node was 12,73±0,89 and 13,70±0.67 respectively, the area of brain cords in iliac lymph node was 14,96 ±0,74, the area of brain sinuses was 15,44± 0,64. The cellular structure of structures of cortical substance of both lymph nodes was presented by generally small lymphocytes, mature plasmatic cells prevailed in brain cords and in a gleam of brain sinus.

The main anti-gene charge was perceived by lymph nodes, regional to the place of developing of malignant tumor at the development of tumoral process [2]. Therefore the important criterion of immune protection was the assessment of the condition of the regional lymphatic course. Thus, inguinal and iliac lymph nodes in the normal conditions had some distinctions in microanatomic organization that structural changes would be different when modeling the tumor. 5 days later after a hypodermic inoculation of tumor, the most expressed changes happened in inguinal lymph node which size had increased in 3,3%, and the sizes of iliac lymph node authentically didn't differ from similar in control group. The area of cortical substance has increased in 11,7% (71,47±0,98), the area of brain substance has decreased in 17,1% in comparison with intact animals. In the structure of cortical substance of inguinal lymph node the relative sizes of secondary lymphoid small knots became bigger by 3,9 times because of the area expense of the herminative centers by 6,3 times (20,08±0,63). The area of iliac zone has increased in 2,1 times in comparison with the group of intact animals. The relative sizes of brain cords and brain sinuses have decreased in 7,3% and 26,2% in brain substance of inguinal lymph node when modeling the tumor (11,81±0,59 and 10,12±0,53). The regional sinus has extended in 84,7% in comparison with a similar indicator in group of intact animals. The expansion of regional sinus testified to the increasing lymph pressure in regional lymph node to the tumor due to the complicated outflow of the lymph and strengthening of biological processing [1,4]. The considerable changes happened in cellular structure of inguinal lymph node when modeling the tumor. In the herminative centers of secondary lymphoid small knots there was the increase in quantity of lymphoblast by 2,2 times, average lymphocytes by 3,5 times, macrophages by 1,5 times and reduction of relative number of small lymphocytes by 27% in comparison with group of intact animals. In paracortical zone the lymphoblast number has increased in 35,2%, small lymphocytes in 7,3% and macrophages in 38,3%, thus the number of average lymphocytes has decreased by 4,3 times (2,15±0,25). The increase in relative density of macrophages occured as protective reactions of the organism, and phagocytosis of macrophages of lymphocytes, neutrophiles and eosinophiles were considered as matrix material for synthesis of antibodies in the course of immunogenesis [2]. The number of plasmablasts has increased by 6 times in brain cords, the quantity of immature plasmatic cells by 2,8 times (25,60±0,40) that exceeded the corresponding value in group of intact animals. The number of macrophages has increased in 17,7%, average lymphocytes by 1,5 times in comparison with intact animals. The quantity of average lymphocytes has increased in brain sinus by 1,6 times (9,70±1,23), small lymphocytes by 2,6 times (51,50±1,76), macrophages by 1,2 times, the number of plasmablasts has increased

by 9,6 times (12,98±0,26) in comparison with the control group. The number of immature plasmatic cells has decreased in 32,7%, mature plasmatic cells by 3,4 times in comparison with a similar indicator in control group. The hypertrophy of structures of cortical substance and cellular changes in structures of inguinal lymph node testified the activation of lymphopoesis in inguinal lymph node [2].

Changes in structure of iliac lymph node were less expressed. The size of cortical and brain substance authentically didn't differ from the corresponding indicators in group of intact animals. In structure of cortical substance the area of secondary lymphoid small knots has increased due to considerable reduction of the area of primary lymphoid small knots. The area of paracortical zone has increased in 2,3% (17,10±0,72). There was the increase in the sizes of brain cords in brain substance in 12,7% and reduction of volume of brain sinus in 12% in comparison with these data in group of control animals. In the herminative centers of secondary lymphoid small knots percentage of lymphoblasts was made 2,32±0,43% that exceeded the corresponding data in group of intact animals by 2,4 times. The quantity of average lymphocytes and macrophages has been increased by 4,9 times and the number of small lymphocytes were decreased. The animals with experimental tumor in brain cords had density of plasmablast of 4,24±0,42 that exceeded similar data in group of control animals by 1,6 times. The number of average and small lymphocytes when modeling tumor has increased by 1,6 times and 1,4 times respectively. The number of mature plasmatic cells has decreased by 1,5 times (52,20±0,61). The number of average lymphocytes has increased by 4,7 times in brain sinus of iliac lymph node, small lymphocytes by 2,4 times, plasmablast by 5,8 times, macrophages by 1,1 times. The number of mature plasmatic cells has decreased by 1,9 times in comparison with intact animals. Antineoplastic immune reaction was carried out generally due to the expense of cellular link of immunity [2]. More expressed changes of cellular compound of iliac lymphatic node could be explained by the fact that part of lymph from the region of tumoral growth passing iliac lymphatic node, got in the iliac lymphatic node.

CONCLUSION

Additional data on the structurally functional organization of inguinal and iliac lymph nodes in the conditions of normal haemo - and lymphcirculation have been obtained. Various response of inguinal and iliac lymph nodes depended not only on extent of anti-gene influence and regionality of lymph nodes to a progression of tumor cells, but it could be caused by initially

different functional specialization. Structural transformations in inguinal lymph node when modeling experimental tumor were expressed more than in iliac lymph node.

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