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Реферати

ОСОБЕННОСТИ ГЛИКОМА СТРУКТУРНЫХ КОМПОНЕНТОВ МИОКАРДА КРЫС В УСЛОВИЯХ ЭКСПЕРИМЕНТАЛЬНОЙ ИШЕМИИ МИОКАРДА

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С использованием рутинных гистологических методов и 8 лектинов различной углеводной специфичности (Con A, GNA, PNA, HPA, CNFA, WGA, SBA, LABA) меченых пероксидазой хрена, исследовали влияние экспериментального инфаркта миокарда на морфологические особенности и углеводные детерминанты миокарда. Показано, что при экспериментальном инфаркте миокарда наблюдается модификация углеводных детерминант структурных компонентов миокарда, особенно эндотелия сосудов микроциркуляторного русла, форменных элементов крови, что может быть важным диагностическим маркером изменения адгезивных свойств и формирования тромбов. Лектин CNFA можно рекомендовать в качестве маркера межклеточных контактов (вставочных дисков) кардиомиоцитов, лектин WGA – маркером эндотелия гемокапилляров миокарда крыс. Увеличение количества макрофагов, которые идентифицировались лектином LABA при деструктивных процессах в миокарде, свидетельствует об активации макрофагической системы в условиях экспериментального инфаркта миокарда.

Ключевые слова: ишемия миокарда, лектиновая гистохимия, кардиомиоциты, эндотелий.

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GLYCOME PECULIARITIES OF THE RAT MYOCARDIUM STRUCTURAL COMPONENTS UNDER EXPERIMENTAL MYOCARDIAL ISCHEMIA

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Using the routine histological methods and 8 lectin-peroxidase conjugates of different carbohydrate specificity (Con A, GNA, PNA, HPA, CNFA, WGA, SBA, LABA), the effect of experimental myocardial infarction on the morphological features and carbohydrate determinants of rat myocardium was studied. It was detected modification of carbohydrate determinants of myocardial structural components,, especially in within endothelium of microcirculatory bed, formed elements of blood, which can be an important diagnostic marker of changes in adhesive properties and formation of blood clots. Lectin CNFA can be recommended for selective histochemical labeling of intercalated disks in between adjusting cardiomyocytes, and lectin WGA – as vascular endothelium marker in within rat myocardium. An increase in the number of macrophages identified by LABA lectin in affected myocardial tissues apparently indicates activation of the macrophage system induced by conditions of experimental myocardial infarction.

Key words: myocardial ischemia, lectin histochemistry, cardiomyocytes, endothelium.

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CLINICAL-LABORATORY AND MORPHOLOGICAL FEATURES OF THE INTESTINAL YERSINIOSIS IN CHILDREN

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The article presents the results on the case histories retrospective analysis in 21 patients diagnosed with intestinal yersiniosis with a detailed study of the disease course with the clinical and anamnestic data analysis. The intestinal yersiniosis course was characterized by the mosaic of clinical symptoms and was accompanied by signs of intoxication syndrome, exanthema syndrome, lymphadenopathy, hepatosplenomegaly with the gastrointestinal tract lesions. Morphological and histological changes of internal organs in children with fatal outcome of the disease were characterized by uneven blood filling, swelling and hemorrhages in the mucous membrane of internal organs, dystrophic changes in parenchymal organs, formation of lymph nodes conglomerates with areas of necrosis. The obtained data indicate that fatal cases of intestinal yersiniosis were found in infants at the background of the complicated premorbid background and the concomitant pathology; they were running as a generalized form of infection (100%) with the development of complications and were caused by 0: 3 and 0: 9 serotypes of Y. enterocolitica.

Key words: intestinal yersiniosis, pathomorphological changes, histological studies, children.

The work is a fragment of the research project "Early diagnosis of dysplastic, meta-plastic and neoplastic changes in pathology of the gastrointestinal tract, respiratory, genitourinary and neuroendocrine systems", state registration No. 0117U000001.

Intestinal yersiniosis is one of the important problems of infectious diseases of children. The topicality of this problem is due to the non-specificity and polymorphism of clinical manifestations, the difficulties of diagnosis, as well as the possibility of infection generalized forms development that end lethally, especially in young children.

The causative agent of yersiniosis is gram-negative polymorphic aerobic bacilli, capable of intracellular existence. Most isolates belong to serotypes: 0: 3 (15-60%) and 0: 9 (1-30%), whereas serovar 0: 3 has a higher enterotoxicity, and 0: 9 has a greater invasiveness. Yersinia of serovar 0: 3 carry the virulence plasmids, therefore, when infected with this serovar, generalized forms more commonly occur in patients. In the generalized infectious process caused by Y. Enterocolitica (0: 3, 0: 8, 0: 9) the pathogen can be multiplied in the bone marrow cells [3].

It has been proved that infection occurs when infected food and water is used or through contact. Having permeated through the gastric barrier, the pathogen penetrates into the small intestine. Its favorite localization is the terminal part of the small intestine and appendix. Clinically, penetration of the pathogen is manifested by the digestive tract dysfunction or abdominal syndrome. The nature of the inflammatory process can vary from catarrhal to ulcerative-necrotic [4].

In children, especially in early childhood, other pathologies of the intestine may be associated with the development of catarrhal ulcer gastroenteritis, enterocolitis, and less commonly gastroenterocolitis in the pathological process. Having enterotoxicogenicity and invasive properties, Y. eterocolitica penetrates through the epithelial cover into the reticulo-endothelial tissue and regional lymph nodes, which increase in size due to hyperplasia of the lymphoid tissue and the formation of necrosis and microabsection foci in them [5].

At this stage (the enteric and regional stages of the disease) the infectious process may end, being limited to clinical symptoms of the gastrointestinal tract impairment. Immune reactivity of the body, sensitivity to various virulence pathogen populations, and the extent of infection determine the possibility of its generalization. With the penetration of microbes from the primary sources of infection into the blood, bacteremia and toxinemia develop. Yersinia is most tropic to organs rich in lymphogenic elements and fixed macrophages (lymph nodes, liver, spleen), where they can persist for a long time, causing repeated waves of the disease or causing the process transition to the chronic state [3].

The most frequent pathomorphological changes are observed mainly in the intestine. There are changes in the mesenterium lymph nodes, which may resemble tumors or pseudo-tumor mesenteric lymph nodes packets. The signs of terminal ileitis, appendicitis are stigmas in this case. Involvement of practically all organs and systems into the pathological process is determined by the development of peribronchitis, pneumonia, nephritis, hepatitis, carditis [5, 8].

The purpose of the work was to clarify the clinical and morphological features of the intestinal yersiniosis course in children.

Materials and methods. According to the purpose of the study, a retrospective analysis was performed based on 21 patients' medical records (11 boys and 10 girls, aged 1 to 17 years with the mean age - 7.6 ± 1.2 years), who were treated in the Vinnytsia Regional Children's Infectious Disease Hospital for the intestinal yersiniosis in 2017 and 2018. Children of early age (up to 3 years old) made 14.3% (3 children), from 3 to 7 years old - 47.6% (10 patients), from 7 to 10 years old - 9.5% (2 children), and the oldest age group from 10 to 17 years old made 28.6% (6 patients). Thus, half of the patients under study were children of pre-school and early school-age (3-7 years). Sexual polymorphism of the study group was characterized by prevalence of boys-patients - 52.4% (11 patients) over girls - 47.6% (10 children).

The degree of severity was assessed by analyzing clinical symptoms and changes in the laboratory tests indices. The study used a retrospective analysis of disease histories with a detailed study of the disease course and analysis of clinical and anamnestic data. The statistical processing of all the result data was carried out using the Microsoft Exel statistical program. Data processing was carried out by the method of variation statistics by computing such statistical variables as the arithmetic mean of the statistical aggregate (M), the average error of the arithmetic mean (m). The reliability of the values difference between relative quantitative values for the correct distribution was determined using Fisher's ratio test.

Results of the study and their discussion. All children under study were divided into 2 groups. The first group included 19 children with complete clinical and laboratory recovery, another clinical group included 2 children, in which the intestinal yersiniosis disease had the lethal outcome. A group of children, in who intestinal yersiniosis ended with complete clinical and laboratory recovery, consisted of 19 children (9 boys and 10 girls) aged from 2 to 17 years (mean age 7.5 ± 1.4 years). By the age, the patients in this group were distributed as follows: children under 3 years of age were 5.3% (1 child), those from 3 to 7 years -36.8% (7 children), age group from 7 to 10 years was represented by 5 children - 26.3%, and children over 10 years old accounted for 31.6% of the total number (6 children). Thus, among children under study, those aged from 3 to 7 years were prevailing.

In the study group, girls prevailed 52.5% (9 children), boys amounted to 47.5% (10 children, respectively). Of the 19 children with intestinal yersiniosis, 14 patients (73.7%) had an average degree, and 4 children (26.3%) had a severe degree of intestinal yersiniosis. When hospitalized, the diagnosis of

intestinal yersiniosis was established in 10 cases (52.6%). At the same time, at the prehospital stage, 3 children (15.8%) were diagnosed with scarlet fever, acute respiratory viral disease was diagnosed in 2 children (10.5%), and infectious mononucleosis, viral hepatitis, food poisoning, enteroviral infection, occurred once in every case (5.3% in all cases).

Among the studied children, the complicated premorbid background was established in 6 patients, which accounted for 31.6%. Among them, 4 children (66.6%) had herpes infection, 1 child had Prader-Willi syndrome (16.7 %) and 1 child had folic acid deficiency anemia (16.7%).

Regarding the epidemiological history of the patients, it was found that 4 children (21.2%) used raw vegetables (cabbage and carrot salad). They were stored in cellars where sinanthropic rodents could live. Although according to scientific studies of other authors, a high prevalence of milk and dairy products infecting with bacteria of the Yersinia (Y.pseudotuberculosis and Y.enterocolitica) genus was found [13]. There is also evidence that pork is the main cause of the yersiniosis incidence in Germany.

The course of intestinal yersiniosis was characterized by the mosaic of clinical symptoms and was accompanied by signs of intoxication syndrome, exanthema syndrome and changes in the skin and mucous membranes, lymphadenopathy, hepatosplenomegaly with lesions of the gastrointestinal tract.

One of the cardinal symptoms of intestinal yersiniosis in children is a long-term pyretic fever. In 100% of children with moderate severity fever, the temperature response was noted. Thus, hyperthermia within the range of 38.5-39.5 ° C was observed in 7 patients (50%), and in 2 children (14.3%) there was a stable pyretic response within the range of 39.5-40 ° C, because, as it is known, hyperthermia is a non-specific defensive mechanism of the body. By comparison, in children with severe course of the disease, in a large number of patients - 80% (4 patients), the disease was running on the background of very high temperature, indicating the severity of the disease course.

The exanthema syndrome occurred in all children with the severe disease course (100%), whereas in patients with moderate degree of intestinal yersiniosis, exanthema was absent in 6 patients (42.9%). The rash was punctuate or confluent maculopapular with the most frequent localization on the hands and feet, on the face, less commonly - in the axillary region, the flexural articular surfaces and on the trunk. The rash spread to other areas with progression of the disease was observed in 7 children (36.8%).

The peripheral lymph nodes hyperplasia in physical examination among all the patients was found in 63.2% of cases (in 12 children), of which 8 patients (66.7%) had all groups of lymph nodes increased, while in the rest ones, enlargement of the mandibular, chin, cervical lymph nodes groups was observed. Lymph nodes were characterized by the sizes up to 0.5-1.5 cm, while they were elastic consistency, painless, not matted together with surrounding tissues, without signs of inflammation. According to the data of ultrasound study, one third of patients with a moderate degree of infection - 5 patients (35.7%) - noted an increase in cervical lymph nodes, in 1 child (7.1%) mesenteric lymph nodes were enlarged isolatedly. While in the group of children with severe disease course, increased mesenteric lymph nodes were observed in 60% of cases (3 patients), because the affected lymph nodes are known as the primary link in the infectious process generalization.

One of the important clinical symptoms of intestinal yersiniosis is hepatosplenomegaly. In children with the severe infection course, 60% of the examined patients (3 patients) had hepatomegalia and splenomegaly. Impairment of gastrointestinal tract organs was manifested by the presence of vomiting, abdominal pain and defecation disorders. The vomiting incidence was almost the same with a moderate and severe degrees of the disease (21.4% and 20% respectively), the pain syndrome dominated in children with the moderate severity disease (35.7% - 5 patients), diarrhea was more characteristic of the severe course and was observed in 60% of cases. Comparing the data obtained with the results of other scientists' studies [11], it was found that signs and symptoms that accompanied yersiniosis were abdominal pain (56.3% in 9 children), fever (25% in 4 patients), vomiting (12.5%, observed in 2 children) and dehydration (6.3% in a single child only).

Laboratory confirmation of the yersiniosis etiology was performed by means of the serological method - indirect hemagglutination test (IHAT) with pseudotuberculous and intestinal-yersiniosis diagnosticum: the antibodies titer and their growth were determined with the intestinal-yersiniosis diagnosticum. As a result of the study, 15 patients (78.9%) displayed antibody titers within the range of 1: 100 - 1: 800, which was a reliable confirmation of the of intestinal yersiniosis diagnosis. In 4 patients (11.1%), the result of the laboratory test was negative, this may be due to the early sampling of the material (3 to 4 days) for this study, when, due to immunological features, there is no growth of the antibody titer.

The treatment outcome in intestinal yersiniosis is known to depend on the disease form. Assignment of etiotropic therapy with the use of a single antimicrobial drug, according to the literature, is effective, although combined treatment is also recommended, for example, aminoglycosides together with

third generation cephalosporins. In vitro, as a rule, Y. Enterocolitica is susceptible to: piperacillin, third generation cephalosporins, monobactams, carbapenems (imipenem), aminoglycosides, tetracycline, chloramphenicol, sulfamethoxazole-trimethoprim, as well as fluoroquinolones [12].

All patients received antibiotic therapy taking into account the empirical sensitivity of the pathogen; thus, 12 patients (63.2%) received fluoroquinolone of the second generation - ciprofloxacin, and 7 children (36.8%) - cephalosporins of the third generation. In addition to etiotropic therapy, all the children were performed detoxification, desensitizing and symptomatic therapy in compliance with the treatment protocols.

Thus, having studied the clinical and laboratory features of the intestinal yersiniosis course, the following was established: children from 3 to 7 years old are more likely to fall ill; polymorphism and nonspecific clinical symptoms leads to errors in the diagnosis at the prehospital stage, since only 52.6% of cases of intestinal yersiniosis has been diagnosed in time. Risk factors have a significant impact on the development of the disease and on the condition severity, namely, a complicated premorbid background and the presence of concomitant pathology. Infection most often occurs in the form of abdominal, icteric and exanthemic forms, with an acute onset and prevailing moderate severity of the disease. The clinical picture is characterized by mosaic symptoms, but the main symptoms of the disease are febrile body temperature, maculopapular exanthema and lymphadenopathy.

The second group of patients consisted of 2 patients, in whom the infection ended with the lethal outcome. In the both cases children of the early (up to 3 years) age, males were diseased. The main complaints were of high fever, rash, edema and jaundice. Clinical picture at the prehospital stage was characterized by symptoms non-specificity with the predominance of general-intoxication syndrome: high fever, weakness, reduced appetite. There was a late request for medical treatment (10 and 5 days respectively). In the both cases, there was complicated premorbid background (rickets, anemia, pathology of the perinatal period), a concomitant pathology (chronic herpetic infection - cytomegalovirus, Epstein–Barr virus (EBV) infection, and parvovirus infection).

The data of the epidemiological history point to the contact of patients with the factors of infection transmission (unwashed vegetables brought from the cellar, contaminated with faeces of synanthropic rodents). The course of intestinal yersiniosis in dead children was severe, with the development of disseminated intravascular blood coagulation (DIC) syndrome and multiple organ failure (enteritis, nephritis, hepatitis, myocardiopathy, pneumonia). In laboratory indices, anemia, leukocytosis, an increased number of atypical mononuclear cells, and thrombocytopenia were observed, as well as pigment metabolism disorder and hepatocytes cytolysis; in the coagulogram - the DIC-syndrome hypocoagulation phase was observed. In the both cases, by the IHAT method, the high titers (1: 400) to Y. Enterocolitica serotypes 0: 3, 0: 9 were detected, the latter being the most virulent pathogen serotypes, capable of intracellular existence. The assigned etiotropic and pathogenetic therapy was adequate, however, it was impossible to prevent the fatal outcome.

During the pathoanatomical study it was established that pathomorphological changes of the internal organs are characterized by uneven blood filling of the internal organs, edema and hemorrhages in the gallbladder wall, in the mucous membrane of the stomach and intestines (fig. 1). There were pronounced dystrophic changes in parenchymal organs, edema and the brain dislocation.

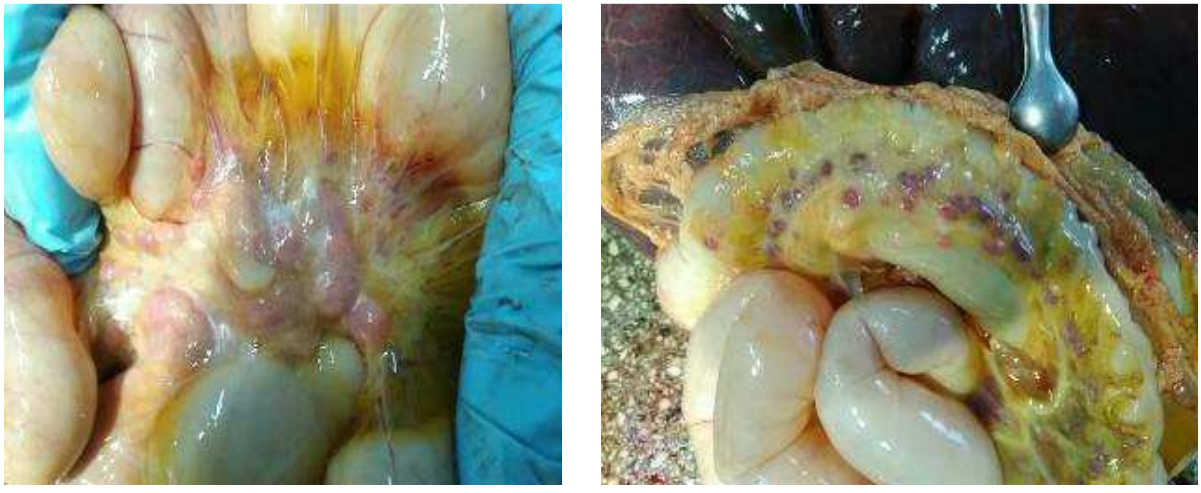


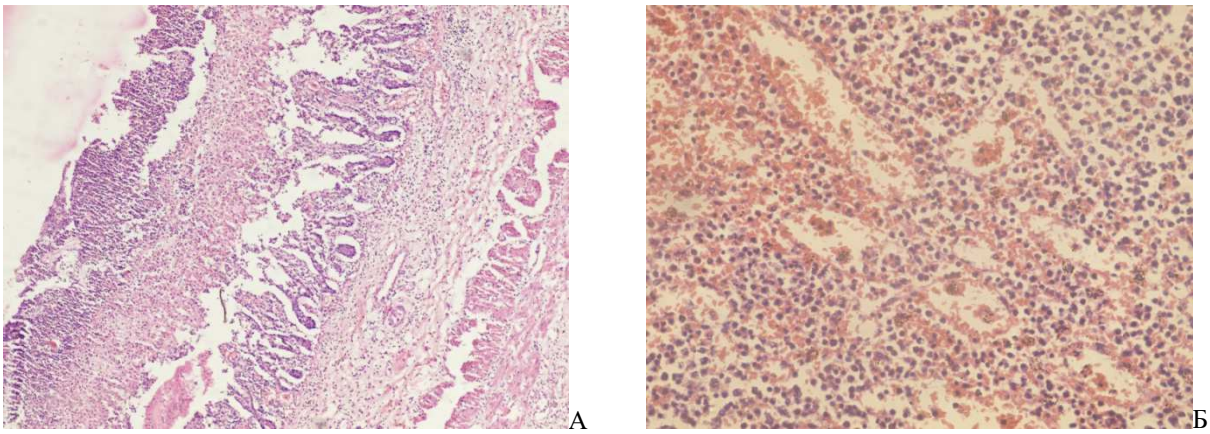
Fig. 1. Hemorrhages in the intestinal mesenterium, enlarged mesenteric lymph nodes.

The most common were changes in lymph nodes located in packages, sometimes forming conglomerates, with hemorrhages and necrosis (fig. 2). Histologic studies of internal organs have shown that usually the typical reaction of tissues to the yersiniosis infection is granulomatous inflammation, in

which histogenesis an important role is played by allergy, namely immediate type hypersensitivity, since central necrosis of granuloma is not only associated with the harmful effects of bacterial toxins, but also with a histopathogenic effect of circulating immune complexes.

According to our results, regarding the heart there was vascular congestion, granular and balloon dystrophy of cardiomyocytes, focal fragmentation of myocardiofibrils, edema of interstitial fibrous tissue with its diffuse lymphohistiocytic infiltration. The pancreas had edema of the interstitial tissue. In the lungs exfoliated alveolar and bronchial epithelium was found. Focal lymphohistiocytic infiltration with a small number of segmented neutrophils and single alveolar macrophages was determined. In kidneys there was a vascular thrombosis of the microcirculation bed, granular dystrophy and necrosis of the convoluted tubules epithelium.

The bulk liver structure was impaired, hepatocytes had signs of pronounced granular and vacuolar dystrophy, necrosis foci were spread, there was abundant lymphohistiocytic infiltration with a large number of segmental leukocytes in periportal tracts and necrosis foci, widespread hemorrhages, blood vessels thrombosis in the microcirculation bed. In our study, the wall of the small and large intestine was characterized by the mucous membrane desquamation into the lumen, diffuse polymorphocytic inflammatory infiltration, numerous lymphoid follicles of large size with hyperplastic germinal centers, epithelioid transformation of reticulocytes and histiocytes, and aggregations of neutrophilic leukocytes with their disintegration (fig. 2).



А Б

Fig. 2. A - destruction of the intestine mucous membrane. B – a lymph node with hyperplasia and necroses (magnification x200, stain - hematoxylin, eosin)

In the spleen, numerous large size follicles with hyperplastic germinal centers, epithelioid transformation of reticulocytes and histiocytes, and aggregations of neutrophilic leukocytes with their disintegration are observed. A large number of macrophages with absorbed microorganisms is found. In the brain, there are pericellular and perivascular edemas, stases in the vessels. Among the fatty tissue of thymus, single small, leukodepleted fragments with cystic-modified Hassall's bodies were determined.

After the literature analysis, it was found that at the early stage of lymphadenopathy, caused by Y. entecrotictica, lymph nodes are infiltrated by lymphocytes, immunoblasts and plasma cells. In addition, hyperplastic follicles are frequently detected. At the later stage, the thickened edematous lymph node capsule sometimes contains lymphocytes, immunoblasts and plasma cells. Later there occur many epithelioid cell granulomas, followed by the formation of central microabscesses [10].

According to the literature, in severe generalized forms of intestinal yersiniosis, hemorrhagic edema and the ileum gland mucosa necrosis are observed, in the mesenterium there are enlarged, hyperemic lymph nodes. The liver is enlarged, hepatocytes undergo dystrophic changes, occasionally, acute hepatitis develops. The spleen is hyperplastic with large germinal centers in lymphoid follicles and with the reduction of lymphoid tissue. In the liver and spleen, multiple small necrotic lesions or abscesses are formed. Frequently enough, blood vessels are damaged: vasculitis, trombovascular disease, fibrinoid necrosis [2, 8].

Histological changes, especially in the liver, spleen, lymph nodes and intestinal wall, found in this patient are pathognomonic of the pathological process caused by Y. Enterocolitica. [1, 2, 11]

In the analysis of fatal cases, certain risk factors for the development of an unfavorable course of this disease have been identified: early age of the child, burdened epidemiological history, poor living conditions, complicated premorbid background (persistent herpetic infection), late admission of the patient to the hospital, difficult early diagnosis due to the clinical symptoms polymorphism, as well as infection with the most pathogenic Y. Enterocolitica serovars 0: 3 and 0: 9, which, in our opinion, has caused the development of a lethal outcome. [15]

Therefore, availability of such clinical data should alert physicians as to the development of unfavorable intestinal yersiniosis course and contribute to the timely establishment of the correct diagnosis and the adequate treatment assignment.

Conclusions

1. As of today, the growth of the yersiniosis incidence in Ukraine, and in the Vinnytsia region in particular, is observed.

2. Based on clinical and laboratory features of the intestinal yersiniosis course, it is established: children from 3 to 7 years are more likely to be diseased; polymorphism and nonspecific clinical symptoms lead to errors in the diagnosis at the pre-hospital stage. Infection most often occurs in the form of abdominal, icteric and exanthemic forms, with an acute onset and prevalence of moderate severity in the disease. Clinical picture is characterized by mosaic symptoms, but the main symptoms of the disease are febrile body temperature, maculopapular exanthema and lymphadenopathy.

3. Morphological and histological changes of internal organs in children with fatal outcome of the disease are characterized by uneven blood filling, edema and hemorrhages into the mucous membrane, changes in the lymph nodes that form conglomerates with hemorrhages and necrotic areas, expressed by dystrophic changes in parenchymal organs, followed by edema and brain dislocation.

4. Having analyzed the features of clinical symptoms, morphological and histological studies, one can identify the risk factors for the development of unfavorable intestinal yersiniosis course: early age of the child (up to 3 years); male gender; late request for medical treatment; burdened premorbid background (rickets, anemia, pathology of the perinatal period); concomitant pathology; immunodeficiency state; infection with the most pathogenic Y.enterocolitica serotypes (0: 3, 0: 9).

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Реферати

КЛІНІКО-ЛАБОРАТОРНІ І МОРФОЛОГІЧНІ ОСОБЛИВОСТІ КИШКОВОГО ЄРСИНІОЗУ У ДІТЕЙ

Незгода І.І., Гаврилюк А.О., Науменко О.М., Асауленко А.А., Холод Л.П., Левицька Л.І., Онофрійчук О.С.

У статті наведено результати ретроспективного аналізу історій хвороб 21 хворого з діагнозом кишковий єрсиніоз з детальним вивченням перебігу захворювання та аналізом клініко-анамнестичних даних. Перебіг кишкового єрсиніозу відрізнявся мозаїчністю клінічної симптоматики і супроводжувався ознаками інтоксикаційного синдрому, синдрому екзантеми,

КЛИНИКО-ЛАБОРАТОРНЫЕ И МОРФОЛОГИЧЕСКИЕ ОСОБЕННОСТИ КИШЕЧНОГО ИЕРСИНИОЗА У ДЕТЕЙ

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В статье приведены результаты ретроспективного анализа историй болезней 21 больного с диагнозом кишечный иерсиниоз с детальным изучением течения заболевания и анализом клинико-анамнестических данных. Течение кишечного иерсиниоза отличалось мозаичностью клинической симптоматики и сопровождалось признаками интоксикационного синдрома, синдрома экзантемы,

лімфаденопатії, гепатоспленомегалії з ураженням шлунково-кишкового тракту. Морфологічні та гістологічні зміни внутрішніх органів у дітей з летальним завершенням захворювання характеризувалися нерівномірним кровонаповненням, набряком і крововиливами в слизову оболонку внутрішніх органів, дистрофічними змінами паренхіматозних органів, утворенням конгломератів лімфатичних вузлів з ділянками некрозу. Отримані дані свідчать, що летальні випадки кишкового єрсиніозу зустрічалися у дітей раннього віку на тлі обтяженого преморбідного фону і супутньої патології.

Ключові слова: кишковий єрсиніоз, патоморфологічні зміни, гістологічні дослідження, діти.

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лимфаденопатии, гепатоспленомегалии с поражением ЖКТ. Морфологические и гистологические изменения внутренних органов у детей с летальным завершением заболевания характеризовались неравномерным кровенаполнением, отеком и кровоизлияниями в слизистую оболочку внутренних органов, дистрофическими изменениями паренхиматозных органов, образованием конгломератов лимфатических узлов с участками некроза. Полученные данные свидетельствуют, что летальные случаи кишечного иерсиниоза встречались у детей раннего возраста на фоне отягощенного преморбидного фона и сопутствующей патологии.

Ключевые слова: кишечный иерсиниоз, патоморфологические изменения, гистологические исследования, дети.

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CARDIOGENESIS CHANGES UNDER THE IMPACT OF CADMIUM CHLORIDE IN RAT EMBRYOGENESIS

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The purpose of the experimental study was to determine the impact of cadmium chloride on the overall course of cardiogenesis with intragastric administration throughout the entire pregnancy period in rats. Experimental studies were carried out on female Wistar rats. To simulate the effect of cadmium chloride throughout the pregnancy, Wistar female rats were daily administered the aqueous solution of cadmium chloride *per os* via a probe at the dose of 1.0 mg/kg. The cardiofetal index growing in the group of exposure to cadmium chloride indicates an increase in the cardiac weight in the group when the embryo body weight is reduced due to intoxication. Microscopically, in 12.3% of rats the atrium endocardium hyperplasia was detected in the group exposed to cadmium chloride at the indicated dose. In 26-29% of rats cadmium chloride also led to changes in the formation of the embryo heart ventricles wall: thickening of both the compact and trabecular myocardium layers and the formation of abnormal forms of trabeculas.

Key words: cardiogenesis, myocardium, heart ventricle, atrium, cadmium.

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The urbanization growth inevitably leads to the environmental conditions complication in the areas occupied by industrial enterprises, transport highways, as well as in the adjacent territories. The environmental changes in industrialized countries necessitate intensive studies of the environmental factors impact on biological objects. In most industrialized countries, the priority eco-toxicants are heavy metals and, in particular, cadmium compounds, which are easily digested by plants in sufficiently large amounts, enter the bio-systems and have the property to accumulate in the body [1, 2]. Despite significant advances in the diagnosis and treatment of many cardiovascular system (CVS) diseases, in the whole world, including our country, their incidence continues to grow in adults and children [3, 10]. Over the past 25 years, the prevalence of cardiovascular pathology among the population of Ukraine has grown by 3 times, and its mortality rate has grown by 45% [7]. At the same time, according to the World Heart League, Ukraine is among the first in the European countries in terms of mortality from blood circulation and stroke diseases.

In Ukraine, since the mid-1970s and until 2016 inclusive, over half of deaths are due to blood circulatory system diseases. In 2016, mortality from the causes of this class reached 920.3 per 100,000 of population [7]. On average, today up to 73.3% of all fatal cases in Ukraine fall under three main causes of death: circulatory system diseases, external causes of death and neoplasm [7].

The results of numerous studies confirm that one of the etiopathogenetic causes is the impact of environmental factors: emissions from industrial enterprises and vehicles, radiation pollution, agricultural chemistry, use of dyes, preservation agents and other chemical additives in food production [6, 9].

However, the influence of cadmium compounds on the development of cardiovascular sytems is an underinvestigated field, both in experimental morphology and in medicine. In a number of studies by