Pro Index Journal of Innovation in Educational and Social Research
Volume: 2 Issue: 12 Year: 2024
ISSN: 2992-894X | http://journals.proindex.uz

Intensity Indicators of Bacterial Translocation in Experimental Acute Obstruction of Small and Large Intestine

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The bacterial translocation (BT) is the passage of bacteria through the mucous membrane of the gastrointestinal tract in extraintestinal body parts [8].

The "BT phenomenon" occurs quite frequently [1, 5, 9]. At present time, this phenomenon is interpreted in two ways: first supporters believe that BT is developing under the influence of stress, injury, or other external extreme impacts and reducing the activity of the immune system, with a pathogenetic link of some diseases; proponents of a second believe that BT is not only the transfer of pathogens endogenous infections in the internal environment of the organism, but also is a natural defense mechanism of the body [4, 6, 10].

It is well known that most often from a normal flora are capable of translocation Escherichia coli, Proteus spr, some other members of the family Enterobacteriaceae, transient strains of Bacillus subtillus, Gram-positive aerobes, a low ability to translocate obligate anaerobes [1, 7, 11].

The justification of urgency and relevance of this research show that numerous scientific works are devoted to clinical, pathogenic and diagnostic aspects of the problem, but studies related to the microbiological aspects of the formation of BT and their place in the development of endogenous infections are not conducted fairly. In this regard, the conduct of pilot microbiological studies to solve this problem is urgent.

Purpose of the study. The study and evaluation of germination of microorganisms from the mesenteric lymph nodes (MLN), liver, spleen, lungs, peripheral and portal blood, peritoneal fluid in the experiment for evaluating the dynamics of the intensity of BT in experimental acute obstruction of the small and large intestine.

Materials and methods. When choosing the experimental material base were plentiful studies in experimental microbiology, convenience of handling, low cost and the possibility of achieving high purity of the experiment in the methodological aspect. When working strictly with all ethical principles of work with experimental animals and the rules of the biological safe.

240 white mongrel mice aged 2-3 months and weighing 18-25 g were used for research.

Before the the experiments, all animals were divided into groups, then they were for 3 days and weighed thermometry was performed. During these days, weight loss and fever are not detected.Identification and differentiation of the seeded microorganisms carried by conventional bacteriological methods. For this «HiMedia» (India) company culture media used.

The results are processed by conventional methods of variation statistics. All studies were carried out on personal computers using the Pocket software for biomedical research. Organization and research carried out on the basis of the principles of evidence-based medicine.

The results and discussion. In carrying out research using model eksperimental acute obstruction of the small intestine (EAOSI) and colon (EAOC) proposed Kruglyandskiy Y.M. [3] in our modification. There were conducted 3 series of researches.

All laboratory animals divided into 4 groups: Group 1 - EAOSI, n = 72; Group 2 - EAOC, n = 72; Group 3 - animals which were opened in the abdominal cavity, but not performed obturation (group comparisons, n = 72); Group 4 - intact laboratory animals (control group, n = 24).In turn, 1, 2, 3

groups were divided into subgroups: 1a, 2a and 3a - EAOSI EAOC and lasted 24 hours (n = 8); 1b, 2b and 3b - EAOSIand EAOC, lasted for 48 hours (n = 8); 1c, 2c and 3c - EAOSI and EAOK, lasted for 72 hours (n = 8).

Given that these deadlines are observed basic clinical, pathological and morphological changes in the walls of the intestine, associated with occlusion [2, 3], we chose these terms of research.Aseptically opened the abdominal cavity with a sterile scalpel. ligature was performed on the edges of the mesentery of the ileum to the formation EAOSI while tried not to involve the mesentery in the pathological process. After the purse string suture ligatures struck and pulled him to the creation of obturation. Thereafter, the abdominal cavity sutured using a surgical needle.

For forming EAOC performed the same events, but only difference being obturation carried on the distal part of the colon.

Laboratory animals of the third group (control group) opened abdominal cavity and sewed Do not apply a ligature to the small and large intestine.In the control group (the fourth group) were not carried out surgery. At autopsy of dead animals strictly observed preostorozhnosti measures to prevent the introduction of micro-organisms from the surface deep into tissues and their transfer from one body to another. Using sterilized tools opened the skin and subcutaneous tissue, took first with biological material of the chest (lungs), then from the abdominal cavity (MLN, liver, spleen). However, with a syringe blood taken from the portal vein (portal blood) and abdominal aorta (peripheral blood), and peritoneal exudate from the peritoneal cavity. For taking the material laboratory animal bodies burned first, and then cut with sterile scissors and forceps capturing a piece of the body caused an imprint on the surface of pipatelnyh sterile environments.

Considering that all normal extraintestinal organs of laboratory animals are sterile the growth of any microorganisms on the surface of bacterial translocation was evaluated as culture media.

It was found that in EAOSI and EAOC the intensity of BT were different depending on the duration of the experiment and its species. We have identsifitsirovany following microorganisms are representatives of normal intestinal microflora - Escherichia spp, Enterobacterspp, Citrobacterspp, Klebsiellaspp, Proteus spp, Staphylococcus spp, Enterococcus spp, Bacteroides spp.

Inoculation of these microorganisms are described proposed us microbiological criterion that determines the intensity of the BT - percentage of germination of microorganisms (PGM).

Research evidence that when EAOSI after a 24-hour period the PGM on MLN was 45,8 ± 5,9% (n = 33). This rate increased after 48 hours to 91.7 ± 3.3% (n = 66), and after 72 hours, this parameter was 100% (n = 72). The difference between the periods were significant (P <0.05).

The PGM indicator different from the liver of the same MLN parameters so if for 24 hours microorganisms were inoculated in the liver 29,2 ± 5,4% (n = 21) cases, then after 48 and 72 hours, these parameters were increased - up to 56, respectively, 9 ± 5,8% (n = 41) and 81,9 ± 4,5% (n = 59). When compared with the results of 24-hour period was confidence respectively P <0.02 and P <0.001. The PGM from spleen of animals differed sharply from that of the previous described bodies. If the 24 hours after the start of the experiment no microorganisms have been identified, then at 48 and 72 hours the figures were - respectively 29,2 ± 5,4% (n = 21) and 31,9 ± 5,5% (n = 23).

A distinctive feature of microbial inoculation of lung parenchyma was that PGM several times was significantly low compared with other organs described. After forming EAOSI 24 hours the growth of microorganisms of the lung tissue was observed, while the PGM after 48 and up to 72 hours - respectively 9,7 ± 3,5% (n = 7) and 15,3 ± 4,2% (n = eleven). In the study comparing the performance of groups and control positive bacteriological indicators are not obtained.

In the next stage of the research examined the intensity of BT on extraintestinal organs of animals at different times during EAOC. It is found that in the subgroup 2a (EAOC after 24 hours) PVM in MLN was at the level of EAOC indicator - 41,7 ± 5,8% (n = 30) versus 45.8 ± 5.9% (P> 0.05) .

However, 48 hours revealed significant differences between these parameters - 59,7 ± 5,8% (n = 43) vs. 91,7 ± 3,3%, (n = 66) - P <0.001. The results after 72 hours were identical in EAOSI and EAOC.

Results of studies on the liver showed the following results: PGM after 24 hours 18,1 ± 4,5% (n = 13) after 48 hours 51,3 ± 5,9% (n = 37) and after 72 hours 80,6 ± 4,7% (n = 58). After 24 hours in the liver EAOC of PGM 1.6 times significantly low compared to EAOSI, but after 48 hours of significant differences between the indicators have been identified (P <0.05).The results obtained for the spleen of PGM different from the results for PGM and liver. Thus after 24 hours of cultivation of the spleen were negative bacteriological results, but after 48 hours of microorganism growth observed where PGM was equal 19,4 ± 4,7% (n = 14) after 72 hours was increased by PGM 1.9 times compared with the previous result of 37,5 ± 5,7% (n = 27) - P <0.001.

Trends in research on lung tissue were similar to data PGM spleen. If indentificate microorganisms failed (0%) after 24 hours, 48 hours later, the figure was 16,7 ± 4,4% (n = 12) and 72 hours PGM significantly increased 2.2-fold (P <0.001) compared to the previous rate - 36,1 ± 5,7% (n = 26).In the spleen in all stages of the experiment between the indicators are not revealed statistically significant differences, but the performance of the PGM lung after 72 hours were significantly different between these models is 2.4 times. As in the studies at EAOSI at EAOCin the group of comparison and control the growth of microorganisms was not found.

The next stage of research was to investigate PVM portal, peripheral blood and peritoneal exudate in these same animals.

The results show that after 24 hours EAOSI in portal blood PGM reached 33,3 ± 5,6% (n = 24), while this figure was EAOC 15,3 ± 5,6% (n = 11), that significantly lower than the previous figure. But after 48 hours of these parameters was significantly increased relative to the previous indicators - respectively 56,9 ± 5,8% (n = 41) and 37,5 ± 5,7% (n = 27) - P <0.001. In addition, significant differences also remained (P <0.001). When studying the following experimental data period (72 hours) and at EAOSIand EAOC PGM was found in all animals - respectively 100% (n = 72). It established that these figures 3.0 and 6.5 times were significantly longer than the indicators 24 hour period of the experiment, and respectively 1.8 and 2.7 times significantly longer than the 48-hour indicators of the experiment (P <0.001).

In these models, and the timing of the experiment conducted microbiological studies with peripheral blood of animals. These results indicate that failed idenfitsirovat microorganisms in both models after 24 hours. But with an increase in the period of the experiment (48 hours) reported the growth of microorganisms. PGM indicators in both models were respectively 19,4 ± 4,7% (n = 14) and 25,0 ± 5,1% (n = 18). The results obtained after 72 hours of the experiment differed from the previous period. When EAOSI obtained result is not statistically different from the previous period (23,6 ± 5,0%, n = 17), but EAOC percentage of positive bacteriological samples were 1.9 times significantly greater (P <0.001) than the 48- hour experiment - 47,2 ± 5,9% (n = 34).

The indicators ofPGM in peritoneal fluid differed sharply from the peripheral blood parameters, but were close to the data portal blood. Research results according to the duration of the experiment (24, 48, 72 hours) were as follows: the EAOSI respectively - 48,6 ± 5,9% (n = 35), 65,2 ± 5,6% (n = 47) and 94,4 ± 2,7% (n = 68); EAOC respectively - 34,7 ± 5,6% (n = 25), 58,3 ± 5,8% (n = 42) and 97,2 ± 1,9% (n = 70).

It should be emphasized that in both models, only when the 24-hour period were significant differences between the figures obtained (P <0.05), not significantly different figures for other terms with each other (P> 0.05).

The comparison and control groups in microbiological studies portal blood and peripheral bacteriological negative results were obtained. However, in the control group of the peritoneal fluid after 48 and 72 hours seeded microorganisms PGM equal respectively - 2,8 ± 1,9% (n = 2) and 4,2 ± 2,4% (n = 3). These controls were identical to other biological samples.

Conclusions.

1. EAOSI and EAOC intensity BT or PGM extraintestinal organs of laboratory animals at different stages of the experiment differed.
2. BT intensity was most pronounced in MLN and liver, and spleen than in lung. The intensity of this phenomenon was directly proportional to the terms of the experiment.
3. PGM of MLN and liver are recommended as a pilot a microbiological criterion for assessing the intensity of bacterial translocation in the experiment.

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