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INFLUENCE OF MODELED MICROGRAVITY EFFECTS ON THE COURSE OF ACUTE PANCREATITIS

Abstract

Development of a disease, including surgical, during long-duration space missions is not improbable. Acute pancreatitis (AP) is one of the most common surgical diseases that has attracted the attention of investigators not only because of local pancreas injury but because of pervasive changes in patient's entire organism as well. Lethality and incapacitation rates are still high. Considering the functional shifts in cosmonaut's organism caused by the spaceflight factors, AP may take some substantially different features. Purpose was to look into differences in the AP clinical course on the background of microgravity-induced effects versus the standard conditions by comparing the blood biochemical data and morphological character of pancreas preparations. Materials and methods. The experiment was performed with Wistar rats weighing 200-250 grams. The rats were distributed into the groups of intact control (G-1), AP in the standard conditions (G-2), intact microgravity-exposed control (G-3), and AP following the exposure to microgravity (G-4). The 14-d tail-suspension model was used to produce microgravity effects in the rats. Acute pancreatitis was provoked by retrograde bile injection in the common pancreatic bile duct with occlusion of the common bile-excreting duct. Heparinized blood plasma was investigated. Chlorides, alanine aminotransferase, aspartate aminotransferase, total amylase, total lipase, pancreatic lipase, total protein, albumin and potassium were used for the control tests. Also, pancreatic tissue was sampled for subsequent histological investigations. Results. Concentrations of amylase, total and pancreatic lipase in groups G-2 and -4 pointed to the AP development confirmed by autopsy findings. Hemorrhagic abdominal exudation observed in all animals of these groups in 24 hours was minor and not quite clear. The hemorrhagic component of necrosis was particularly apparent in the G-2 animals. Histological investigations of G-2 pancreatic preparations revealed plethora, leukocytes infiltration into the pancreatic capsule, severe edema, plasmatic impregnation and a few necrosis loci. Plethora and interstitial edema were found in G-4, too; however, compared with G-2, necrosis loci were much less in number and the pancreatic tissue had a more distinct structure. Conclusion. Based on the biochemical data about the pancreatic enzymes activities, AP takes a better compensated course when developed following the microgravity exposure than in the standard conditions.