Morphofunctional changes in the hippocampus of rats during sham surgery with halothane anesthesia in combination with bioresonance effects

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Morphological changes in rat hippocampus during the false transactions galotanovym anesthesia in combination with bioresonance influence

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SUMMARY

The experiment studied the effect of bioresonance effects on the process of normalization of morphological and functional changes in the hippocampus of rats during inhalation anesthetic halothane and sham surgery. The use of bioresonance effects has a positive effect on the process of normalization of the morphofunctional state of neurons in the CA1 / CA3 fields of the rat hippocampus after a sham operation under conditions of halothane anesthesia.

Key words: hippocampus, bioresonance effect, rats, halothane,sham surgery, postoperative complications, GAD 65/67 positive cells.

RESUME

In the experiment we research the influence of bioresonance effect on the normalization of morfofunctional changes in rat's hippocampus during false operation under halothan anesthesia. Bioresonance intervention has a positive effect on morfofunctional condition of CA1 / CA3 neuronals fields of rat's hippocampus during false operation under halothan anesthesia.

Keywords: hippocampus, bioresonance effect, halothan, false operation, postoperation complications, GAD 65/67 positive cells.

A significant expansion of the range and volume of surgical interventions in cardiac surgery in recent years has led to an even greater increase in the incidence of postoperative complications, which significantly reduce the quality of treatment and often pose a threat to the patient's life [1]. Surgical trauma and anesthesia cause significant changes in the patient's body, which can manifest itself in the form of complications from the central nervous system, respiration, blood circulation, etc. The main stress of compensatory reactions, as you know, falls on the first

the phase of the postoperative period, a number of factors of which (the aftereffect of inhalation drugs for anesthesia, pain, the effect of a surgical wound) are a source of stress for the patient.

In the integrative activity of the brain, the main role is played by its limbic system, which ensures the interaction and coordination of exteroceptive and interoceptive signals. Interest in the limbic system of the brain is associated with the fact that it is considered as a center of emotional control, and the hippocampus is considered the key structure of the limbic system [2]. The hippocampus located in the temporal lobes of the brain is that structural and functional formation, which, at a high level of emotional stress, participates not only in the assessment of the stress factor, but also in the implementation of adaptation and compensatory mechanisms [3, 4]. Morphological studies during experimental reproduction of stress have shown that, along with the hypothalamus, which is considered the most "interested" structure in the formation of a stress response,

Inhaled anesthetics (for example, halothane), as well as surgery, are powerful stress on the body [6]. From the analysis of the literature data, as well as from our earlier results, it follows that stress causes structural and functional changes in the hippocampus and that, under stress stimuli, the CA3 field carries a heavier functional load than the CA1 field. It has been shown that, in response to stress, the functional activity of pyramidal neurons in the CA1 field of the hippocampus increases, and in CA3 it decreases [7, 8].

In this regard, the study of the state of stress-limiting systems of the body after anesthesia and surgical intervention and surgical methods that contribute to their rapid recovery has become the most urgent.

Bioresonance therapy (BRT), as it seems, is one of such methods that allows for adaptive control and adjustment of the functional systems of the body to activate mechanisms aimed at eliminating pathological processes [9]. A distinctive feature of the BRT method is the desire to determine the main pathogenetic mechanism to optimize the level of exposure, strictly aimed at its elimination.

However, at present, there are only a few experimental evidences of the effectiveness of the use of BRT exposure in induced stress syndromes, which does not allow using this method in the clinic with reasons and from the standpoint of evidence-based medicine [10]. More detailed and focused on modeling postoperative stress experiments and more prolonged studies are needed.

The aim of this study was to study the effect of BRT-influence on the process of normalization of the morphofunctional state of the hippocampus of rats during sham surgery with halothane anesthesia in the experiment.

Material and research methods

The objects were 100 white laboratory rats, weighing 160-180 g. All animals were subjected to the same procedure, including a sham operation (laparotomy) performed under halothane anesthesia. The animals were divided into the following groups: control group - 40 intact animals, the first experimental group - 30 rats after surgery with anesthesia, the second experimental group - 30 rats after surgery with anesthesia and BRT exposure. The second experimental group was subdivided into three more subgroups on the basis of the BRT treatment scheme. Animals in the first subgroup 1 hour after surgery and anesthesia received a single BRT exposure, in the second subgroup - two BRT exposure 1 and 24 hours after surgery and anesthesia and in the third subgroup - 4 BRT exposure after 1 hour and 3 th; 5th and 7th day after surgery with anesthesia. Animals of the first experimental group also served as control for the animals of these subgroups, the material for the study of which was taken, respectively, 1, 24 and 168 hours after the operation with anesthesia.

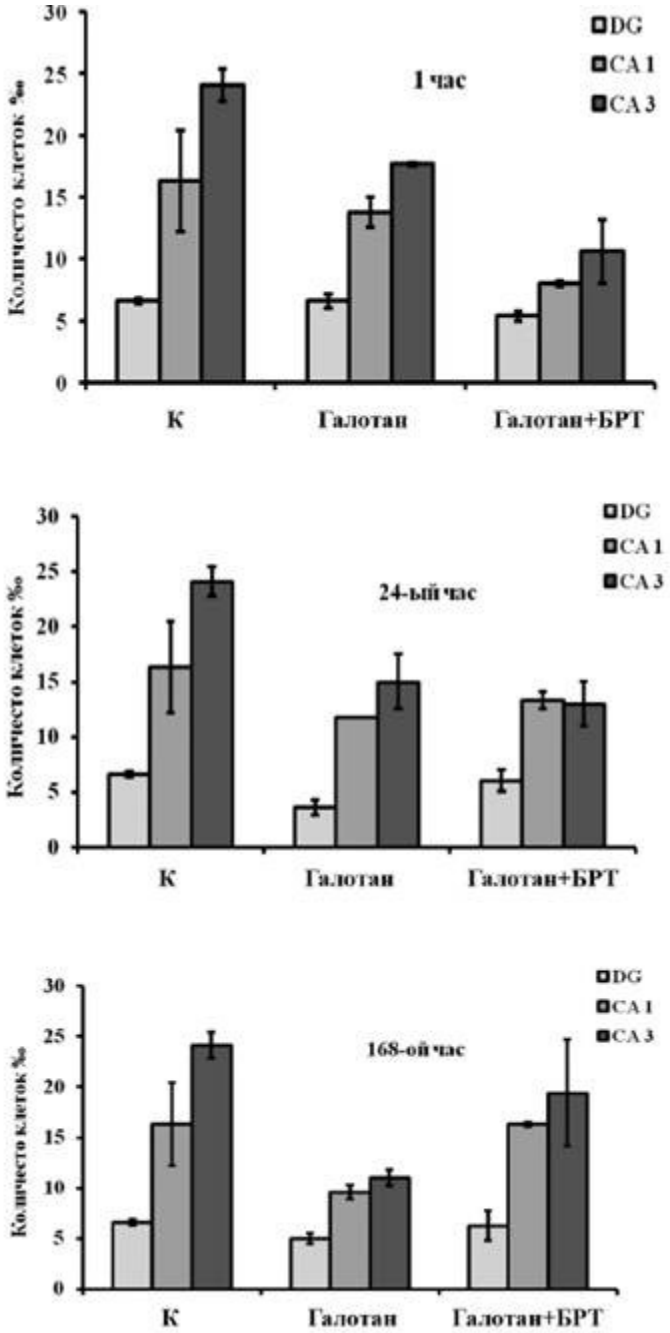
BRT-exposure was carried out using the hardware and software complex "IMEDIS-EXPERT", produced by the Center "IMEDIS" (Russia). With the onset of anesthesia, sugar crumbs were placed in an inverse container, on which the spectrum of the electromagnetic frequencies of halothane (1: 1) was recorded. A freshly prepared native preparation of the hippocampus, as well as a homeopathic organopreparation of the hippocampus (comp) from a drug selector was placed in the second container of the apparatus for BRT. Endogenous BRT was carried out in the mode of time modulation, in the frequencies of the "alpha rhythm" (15 min.), "Anesthesia program" (20 min.), "Stress program 1" (30 min.). On the following days - in the "alpha rhythm" (15 min.) And "stress program 1" (30 min.) Modes. The device for magnetic therapy "belt", connected to the BRT apparatus, was located in the immediate vicinity of the experimental animals.

Assessment of the morphofunctional state of the hippocampus was carried out separately for the right and left hemispheres of the brain. Tissue samples were embedded in paraffin, then sections with a thickness of 5–7 μm were prepared and stained with hematoxylin-eosin according to the standard technique. The preparations were studied using light microscopy (LOMO, Russia). The activity of glutamic acid decarboxylase (GAD65 / 67) was determined by the immunohistochemical method (anti-Glutamic Acid Decarboxylase 65/67 antibody produced in rabbit.abcam was used). All data were processed using the standard variation statistics method. The reliability of the results was assessed by the Student's test within the limits of 95–99% reliability.

Results and its discussion

As a result of the studies, it was found that the action of the inhalation anesthetic halothane causes a decrease in GAD 65/67 positive cells in the CA1 and CA3 fields of the rat hippocampus. The negative effect of halothane is primarily manifested in relation to the neurons of the CA3 field. The data obtained in these experimental series are consistent with previous experimental studies, in which it was also found that when halothane is used as an anesthetic, the number of GAD 65/67 positive pyramidal cells CA1 and CA3 of the hippocampal fields changes [8].

The results of the study of the histoarchitectonics of the hippocampus in the control and both experimental groups in dynamics are shown in Fig. 1.



Rice. 1. Dynamics of the numberGAD65 / 67 positive cells in fields CA1, CA3 and summary data of the dentate fascia of the hippocampus (left and right hemispheres) in dynamics after a sham operation with halothane anesthesia and BRT-impacts:

- after 1 hour (1 BRT exposure),
- after 24 hours (2 BRT exposure),
- after 7 days (5 BRT-effects).

K - background indicators of the control group of animals (intact).

The number of GAD65 / 67 positive cells decreases sharply in fields CA1, CA3 and dentate fascia 24 and 168 hours after sham surgery under halothane anesthesia. The conducted BRT influence positively affects the process of normalization of the morphofunctional state of neurons in the CA1 and CA3 fields of the hippocampus of white rats after sham surgery under conditions of halothane anesthesia. The tendency in the processes of normalization of neurons in the rat hippocampus is more pronounced in the CA1 field, after the BRT sessions, and is partially manifested already 24 hours after the operation (Fig. 1). The positive effect of BRT, which is expressed in the restoration of the number of GAD 65/67 positive cells in the rat hippocampus (trend), is achieved on the seventh day (168 hours) after the sham operation with halothane anesthesia. It was found statistically unreliable, but, however,

In contrast to the CA3 field, BRT stimulates an increase in the number of GAD 65/67 positive cells in the CA1 field after 168 hours. The obtained results suggest that several BRT-effects are characterized by a tendency of the ability to restore the number of GAD 65/67 positive cells in the hippocampus of rats 7 days (168 hours) after sham surgery under conditions of halothane anesthesia.

The results obtained are in accordance with the data of E.V. Kudinova, in which it was experimentally proved that in animals under stress there is a reorganization of the limbic structures of the brain, and, in particular, this applies to the hippocampus [10]. These changes affected the CA3 field of the hippocampus, as well as the CA1 field, which alter the integrative triggering activity of the entire brain of animals. The possibility of restoring those morphofunctional changes that manifested themselves in the hippocampus of rats after sham surgery with halothane anesthesia was shown in our studies based on the results of BRT effects, as evidenced by an increase in the number of GAD65 / 67 positive cells in fields CA1, CA3.

conclusions

Our experimental studies devoted to the study of the correction using the methods of BRT-effects of those morphofunctional changes in the hippocampus that occur during a sham surgery with halothane anesthesia, made it possible to establish the following:

1. It has been established that the action of the inhalation anesthetic halothane causes a decrease in GAD 65/67 positive cells in the CA1 and CA3 fields of the rat hippocampus. The negative effect of halothane is manifested primarily in relation to the CA3 field neurons in the hippocampus of animals.

2. It has been shown that the used BRT effect has a positive effect on the process of normalization of the morphofunctional state of neurons in the CA1 and CA3 fields of the rat hippocampus after sham surgery under halothane

anesthesia. The process of normalization after BRT exposure in the rat hippocampus was more pronounced in neurons in the CA1 field, partially manifested 24 hours after exposure and sham surgery with halothane anesthesia.

3. The positive effect of BRT exposure was expressed in the restoration of the number of GAD 65/67 positive cells in the rat hippocampus, which is reached on the seventh day (168 hours) after sham surgery under conditions of halothane anesthesia.

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