THE FEATURES OF NEUROLOGICAL STATUS WHEN PLAYING TWO - AND FOUR-VASCULAR MODELS OF CEREBRAL ISCHEMIA IN RATS
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Abstract:
The dependence of the psycho-neurological deficit in rats the severity of brain damage in two - and four-vascular models of cerebral ischemia. The study results prove the tendency of deterioration of the neuropsychiatric status of the animals with increasing severity of ischemic brain damage, which allows the degree of violation of the behavioral reactions to judge the severity of ischemic brain damage and its correction.

Key words: Brain ischemia, Neurological deficits, Rats.

Introduction:
Acute ischemic disorders of cerebral circulation are the most common among all cardiovascular diseases. The problem of timely pathogenetic treatment of this pathology is crucial due to the widespread prevalence, high mortality, disability and social exclusion suffered by her patients[1, 2, 3, 4].Search approaches for the correction is carried out using the methods of molecular screening [5], cellular [6], the integral organ and organismal level [7-14].In the last decade significantly increased the proportion of research in the study of the pathogenesis of ischemic brain lesions, as well as searching brand-new of drugs, cerebroprotectors. Studies of damage mechanisms in this disease are of great practical importance for neurological clinics [15]. Various options disorders of blood circulation in cerebral ischemia was the cause of the development of a large number of experimental models of local and total cerebral ischemia with a lot of modifications.

Methodology: The Experiment was conducted on 40 adult male rats Wistar, weighing 230 - 250 grams. Rats were randomized according to the degree of resistance to hypoxia.
Rats were divided into 4 groups (n=10): I - intact; II - lineameriloan, III - two-vascular rats with local cerebral ischemia, the IV- rats with four-vascular total ischemia. Rats were anesthetized (chloral Hydrate 300 mg/ml) and simulated pathology.

To simulate ischemia two-vascular used methods Hossmann K. A [16], and for four-vascular pathology - a modified technique, Mitsuo Yamaguchi and co-authors [17]. The ischemic period lasted 4 minutes. It was further assessed the appropriateness of performing the procedure [18, 19]. Assessment of the neurological status of the animal was carried out in 3 stages: assessment of dynamics of neurologic disorders on a scale McGrow in 1, 3, 7 and 14 days [20, 21]; the first day - "Elevated cruciform maze"; on the second day - "Infrared activity monitor" [22]. At the beginning of the experiment, all animals underwent behavioral tests "Elevated cruciform labyrinth", "Infrared activity monitor".

Assessment of the impact of pathology on the motor and orienting-exploratory activity of animals in tests "Infrared activity monitor", "Elevated cruciform labyrinth", was carried out depending on time and the first time assessed the neurological deficits of the animals.

Results: After modeling pathology was carried out registration of the electrical activity of the brain rats. When playing a model of cerebral ischemia by both methods was observed a decrease of EEG amplitude. In the case of two-vascular simulation model, reduction of EEG amplitude occurred up to the contour. When two-vascular model this was not observed. Further produced the three-stage assessment of the neurological status of the animals. For control taken the data obtained from lineameriloan animals, which were not statistically different from intact animals. Neurological deficit in rats after two-vascular four-minute ischemia was characterized by reduction of motor activity of animals. 3, 7 and 14 day symptoms faded (tab. 1).

Table 1: The dynamics of severity of neurological disorders in the studied groups (average score per group).

<table>
<thead>
<tr>
<th>Period</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>intact</td>
</tr>
<tr>
<td>1 Day</td>
<td>0</td>
</tr>
<tr>
<td>3 Day</td>
<td>0</td>
</tr>
<tr>
<td>7 Day</td>
<td>0</td>
</tr>
<tr>
<td>14 Day</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: * (p<0.05) in relation to lineameriloan animals.
Neurological deficit in rats with four-vascular diseases had more severe symptoms \((p<0.05)\): 20\% of the rats was observed paralysis of the left hind paw and Polopos right eye. The total percentage of rats with polyptoton equal to 30\%. The same was observed lethargy movements, weakness of the limbs, tremor, which to 3 days after modelling pathology disappeared. On day 3,7,14 remained a paralysis of the hind left limb and Polopos right eye.

In the simulation two-vascular pathology, disorders of behavioral reactions was to decrease the number of racks, the number of incidents of urination and defecation. Was also a trend to reduce the number of trial tests sesivany with uplifted cruciform labyrinth \((p<0.05)\) (tab. 2). Four-vascular in animals with cerebral ischemia disorders behavioral reactions are more pronounced \((p<0.05)\).

When assessing the motor activity of the animals in the test actimetry with an infrared activity monitoring IR Actimeter the activity lonaprisan rats compared to intact is reduced but not significantly \((p>0.05)\). With the increase in the experiment of ischemic-reperfusion of the damaged area of the brain activity of rats decreases: decreases in General activity, the number of stereotyped movements, maximum speed, total distance. With increasing time of ischemia of the brain increases \((p<0.05)\).

Conclusions: Thus, the experiments clearly observe a trend deterioration of the neuropsychiatric status of the animals with increasing severity of ischemic brain damage, which allows the degree of violation of the behavioral reactions to judge the severity of ischemic brain damage and its correction. Therefore, impaired psycho-neurological status can serve as a criterion in the selection of the severity of ischemic injury in the experiment.

**Table 1:** Evaluation of behavioral activity of all animals in the experiment.

<table>
<thead>
<tr>
<th>Критерии</th>
<th>Group</th>
<th>Group</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>intact</td>
<td>lineameriloan</td>
<td>two-vascular pathology</td>
</tr>
<tr>
<td>Total activity</td>
<td>10067±51</td>
<td>849±50</td>
<td>610±40</td>
</tr>
<tr>
<td>The movement stereotypes</td>
<td>79.40±5.88</td>
<td>60.40±2.74</td>
<td>38.15±2.37</td>
</tr>
<tr>
<td>Maximum speed</td>
<td>25.50±2.03</td>
<td>24.68±2.10</td>
<td>22.41±1.47</td>
</tr>
<tr>
<td>The total distance</td>
<td>1728±81</td>
<td>1257±51</td>
<td>908±66</td>
</tr>
<tr>
<td>The Stoics</td>
<td>10.50±0.86</td>
<td>10.10±0.80</td>
<td>7.10±0.54</td>
</tr>
<tr>
<td>Hanging</td>
<td>4.80±0.66</td>
<td>4.40±0.70</td>
<td>4.10±0.36</td>
</tr>
</tbody>
</table>

Note: * \((p<0.05)\) in relation to lineameriloan animals.
Conclusions:

Thus, the experiments clearly observe a trend deterioration of the neuropsychiatric status of the animals with increasing severity of ischemic brain damage, which allows the degree of violation of the behavioral reactions to judge the severity of ischemic brain damage and its correction. Therefore, impaired psycho-neurological status can serve as a criterion in the selection of the severity of ischemic injury in the experiment.

References


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