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Changes in DOPAC, 3-MT, DOPAC/DA, HVA/DA, 3-MT/DA in the Hippocampus After Simulated Septoplasty and Maxillary Sinusotomy

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Abstract:

Objective: to evaluate changes in DOPAC, 3-MT, DOPAC/DA, HVA/DA, 3-MT/DA in the hippocampus after simulation of septoplasty and maxillofacial surgery in rats.

Materials and methods. Simulation of operations was carried out on male Wistar rats under general anesthesia with Zoletil 100 solution. In group 1, septoplasty (n=10) was simulated by the standard method by zigzag scarification of the nasal mucosa. In group 2 (n=10), dental implantation with a titanium implant was performed after the implant bed was formed using drill. In group 3 (n=10), only implant bed was made in the alveolar ridge of the upper jaw without subsequent manipulations. In group 4, 10 rats underwent sinus lifting with bone chips with immediate implantation of a titanium implant. In group 5 (n=10)– with the help of a micro drill through a pre-formed implant bed in the alveolar ridge of the upper jaw, a maxillary sinusotomy was performed with damage to the mucous membrane of the ipsilateral maxillary sinus. Liquid chromatography with electrochemical detection was used to determine the concentration of dopamine (DA), homovanilic acid (HVA), 3,4-dihydroxyphenylacetic acid (DOPAC), 3-methoxytyramine (3-MT) in the hippocampal formation. DOPAC/DA, HVA/DA, 3-MT/DA were also determined.

Results. The concentration of dopamine in the hippocampus, compared with the control, was significantly higher in group 5 and lower in group 4. The HVA concentration was significantly higher in group 2, group 5 (p<0.01) and group 1 (p<0.05). An intergroup comparison determined that the concentration of HVA was significantly higher in group 2, compared with the rest of the experimental groups (p<0.001). In groups 1, 3 and 4, this indicator was significantly lower compared to group 5 (p<0.01). The DOPAC level was significantly higher (p<0.01) compared to the control data. The concentration of 3-MT was significantly higher in groups 4 and 5 (p<0.001), as well as in group 1 (p<0.05) and in group 3 (p<0.01).

Conclusion. After simulating sinus lifting with immediate implantation and dental implantation complicated by maxillary sinusotomy, there is an increase in the concentration of dopamine metabolites 3-MT, HVA and DOPAC, but at the same time a decrease in dopaminergic activity of the hippocampal formation, compared with simulation of septoplasty and simple damage to the alveolar ridge of the upper jaw. Such changes are markers of disruption of adaptation processes after surgery in the head and neck.

Keywords:

septoplasty, hippocampus, dentate gyrus, dopamine, homovanilic acid, DOPAC, 3- MT, DOPAC/DA, HVA/DA, 3-MT/DA.