FAST PROTOTYPING FOR SIMULATION OF THE UPPER AIRWAYS

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The main objectives of the project: development of the basic scheme of the pneumatic stand, development of the prototype of the pneumatic stand, development of the structural and functional scheme of the pneumatic stand, specification of aerodynamic characteristics and numerical criteria for assessment of nasal breathing disorders based on aerodynamic tests. Testing to demonstrate aerodynamic test technology. For the first time, theoretical data were obtained and refined by conducting experimental studies of field models on an aerodynamic stand. The influences of local aerodynamic resistances on the general conductivity of the upper respiratory tract are determined. At the same time areas, for example, a lattice bone and others where diffuse, instead of aerodynamic processes prevail are separated. Mathematical modeling and research of influence of different types of local resistances of a nasal cavity on nasal aerodynamics at breath are carried out. The main aerodynamic supports at typical changes of architecture of a nasal cavity are defined. Theoretical calculations and mathematical models exist in the world and in Ukraine, but there are no natural models of the nasal cavity in the norm and some pathological conditions and appropriate aerodynamic stands for their testing. But this just allows you to get unique experimental data on changes in airflow during respiration depending on the pathological conditions.

On the basis of these data by means of methods of computer planning of surgical interventions and modeling of a necessary configuration of a nasal cavity it is possible to predict functional result of operation.

The small length of the nasal cavity compared to the area of interaction of local resistances (more than 2 times less) does not take into account their total air resistance, so it is advisable to determine the total local aerodynamic nasal resistance to take into account only local resistance. Aerodynamic stands for testing full-scale models of the upper respiratory tract should include a flow meter and pressure transducers at several characteristic measuring points. Such points are located at the entrance and exit of the experimental model and near the characteristic configurational changes of the nasal canal, which characterize the local aerodynamic supports.

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