

Feasibility of a new method eversion endarterectomy which is based on the construction of the mathematical model of calculation of hemodynamic features of blood flow

V.S. Overko¹, N.V. Yasnopolskaya², Yu.V. Rodin², Yu.A. Skobtsov³

¹ *National University of Donetsk, Ukraine, e-mail: overko.vitalij@yandex.ru*

² *Institute of emergence and reconstructive surgery, Ukraine, e-mail: yasnopolskayan@gmail.com*

² *National Technical University of Donetsk, Ukraine, e-mail: ya_skobtsov@list.ru*

The aim is to study of the hydrodynamics of blood flow in the bifurcation of the carotid artery to the mathematical proof of the differential approach to the choice of the method of operation and optimizing the way the eversion carotid endarterectomy (ECEn). Calculations have performed for flow in the bifurcations of the carotid arteries in the following cases: a) bifurcation does not require surgical intervention (NO-model), b) after surgery without forming anastomosis (OSA-model), c) after surgery with the formation of the anastomosis (OA-model), d) after surgery with the formation of the anastomosis on the proposed methodology (OAN-model).

During the cardiac cycle, there has been an increase in the flow rate in the ICA and ECA arteries for OA and OSA models. Maximum alteration of the flow rate for OSA-model is approximately 35% and for OA-model - 10%. The reconstruction of the formation of anastomosis on new methodology changes flow does not exceed the costs prior to surgical intervention. Computer simulation showed that the formation of a new anastomosis the flow rate of blood flow in the ICA and the ECA have remained practically unchanged compared with the cost of not operated in the branches of the bifurcation, and surgery without the use of ECEn leads to significantly redistribution of blood flow.