The influence of carotid artery stenosis treatment on changes of cerebral blood flow volume and cognitive functions.

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Objective:

The aim of this study covered assessment of the correlation between the Cerebral Blood Flow (CBF) changes and its influence on Cognitive Functions (CF) after surgical treatment of the symptomatic, >70% Internal Carotid Artery (ICA) stenosis.

Methods:

Study group contained 30 patients (13 female, 17 male) qualified for carotid endarterectomy due to symptomatic, >70% ICA stenosis. In all patients the Rey Auditory Verbal Learning Test (RAVLT) memorizing and repeating 15 words 5 times, Maze Test (MT) and the assessment of the CBF in Doppler ultrasonography (sum of the flow volumes in internal carotid ICAs, external carotid ECAs, vertebral artery VAs) were performed preoperatively and 2-3 days after the surgery. Patients with preoperative CBF lower than reference values [1] were called no compensation , with CBF similar to reference values mild compensation , and with CBF higher than reference range significant compensation .

Results:

CBF reference values: 898,5±119,1 ml/min 65-69 years, 838,5±148,9 ml/min 70-74 years, 805,1±99,3 ml/min 75-79 years, 685,7±112,3 ml/min ≥80 years[1]. Preoperatively there were 20 patients with no compensation and 10 patients with mild compensation . There were no significant compensation patients in the study group. In no compensation group the average increase in CBF of 182,6 ml/min (p=0,00008) was accompanied by significant increase in RAVLT of 9,7 words (from 36,3 to 46, p=0,000906). In mild compensation patients CBF increase of 91,57 ml/min (p=0,26) was accompanied with non-significant increase in RAVLT of 5,7 words (from 35 to 40,7, p=0,375). In MT the significant decrease of 56,2 seconds in test time from 98,2 to 42 seconds was observed in the whole study group (p=0,02), however there were no significant difference between no and mild compensation groups (Fig1).

Conclusion:

Carotid stenosis treatment results both in CBF increase and improvement in cognitive functions. The benefits are more pronounced in patients with lower preoperative CBF values.

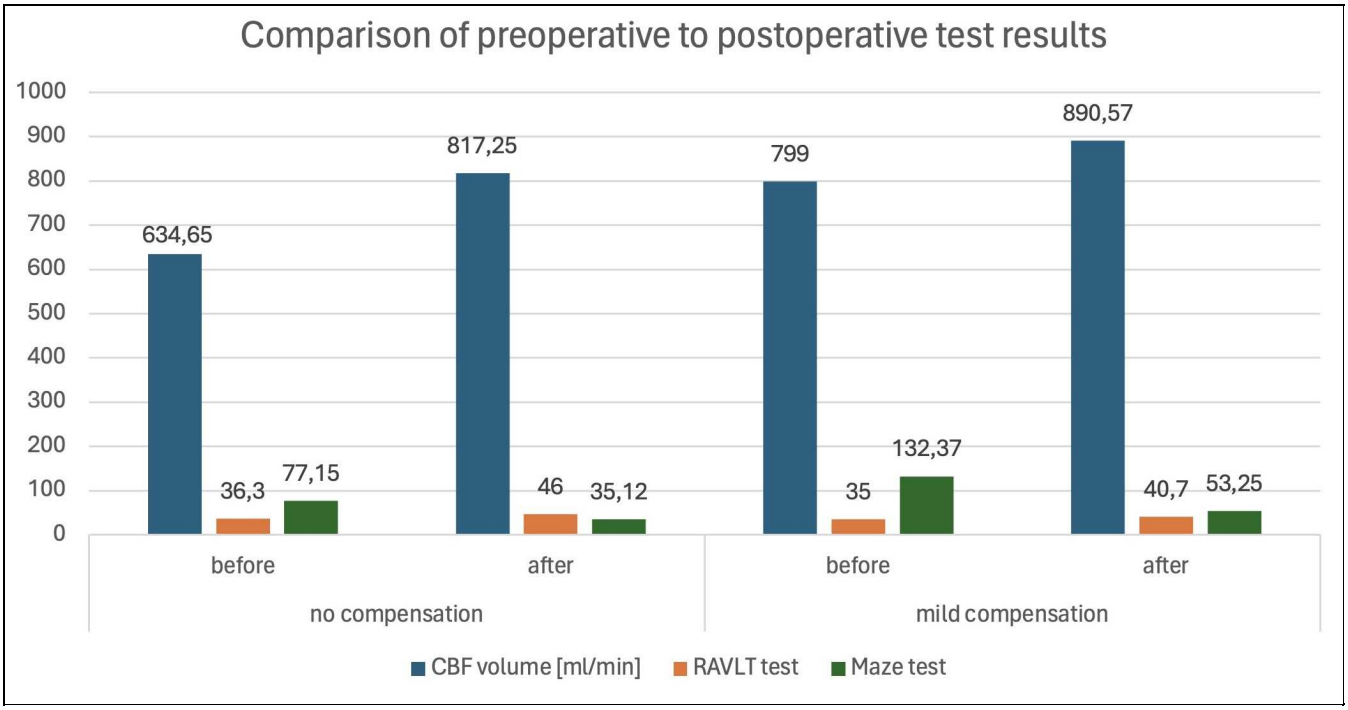

Fig 1 Comparison of preoperative and postoperative results of CBF and CF tests