

CONTROVERSIES CONCERNING POSSIBILITIES FOR BRAIN RECOVERY AFTER STROKE FOLLOWING CAROTID ENDARTERECTOMY AND/OR CAROTID STENTING

B. Bartko I. Combor O. Pechanová J. Lietava

V. Dostal M. Boselova

Central Military University Hospital, Institute of Medical Sciences, Neurosciences & Military Health, Institute of Normal & Pathological Physiology, Slovak Academy of Sciences and 2nd Dept. of Internal Medicine, Comenius University, Institute of Biochemistry Ruzomberok, Bratislava, Slovakia

Introduction: CEA has been considered the gold standard for symptomatic and asymptomatic ICA stenosis. Some risk of CI or death and some complications resulting from surgery still remain. In recent years has been increasing enthusiasm for carotid angioplasty and CAS as an alternative or complementary method to CEA. It has some advantages, showed promising results. Data concerning relationship between these procedures and recovery of brain functions are lacking. **Aim:** to compare both of these therapeutic possibilities in relation to brain recovery **Material:** Data from Medline (1998-2008), Cochrane Library, EMBASE, SCI, leader expert's opinion. **Results:** Both these procedures have different early risk of death or stroke. Specialists advisors expressed uncertainty concerning efficacy as well as safety of CAS comparing CEA. What kinds of differences, concerning recovery of brain functions do exist using CEA or CAS? 1. Both these procedures are **not performed in the early phase** after the onset of stroke. 2. Theoretically, the earlier the procedure is performed the better results are reached. 3. Practically the results of the early intervention brought high complication rate, therefore they are not performed. 4. The results of delayed intervention brought different results in CEA and CAS concerning death, stroke and complications. It is well known that the ischemic lesion some days after the onset of stroke represents the stable state. In such situation it is questionable what kind of benefit can we reach using these methods in relation to CBF, prevention of embolisation and recovery of brain function. After stenosis or occlusion there are three possibilities to reduce or eliminate functional impairment: 1. recanalisation, 2. recovery on the molecular level - neural plasticity associated with repair processes, 3. compensation or substitution of function. The recanalisation needs to be performed within therapeutic window. In stroke pts, CBF to the ischemic area is reduced due to stenosis or occlusion of supplying artery according to the formula for BF (in this case CBF) and diameter of artery can be calculated according to Poiseuille's equation

$$BFR = \frac{PP \cdot r^4 \cdot PR}{v}$$

$$r = \sqrt[4]{\frac{BFR \cdot v}{PP}}$$

All procedures (CEA, CAS, mechanical recanalisation) allow to improve CBF, i.e. the perfusion blood volume to the ischemic area increases. The neurological symptoms may occur only at the moment when the ICA becomes occluded. If no further symptoms occur, there is no indication for surgical or radiological intervention, i.e. there is no indication for CEA, CAS or mechanical recanalization with the aim to increase CBF. These procedures are indicated only to prevent recurrent stroke. If it is not this case, and **rCBF is reduced**, autoregulation is missing, collateral circulation is not adequate and consequently focal ischemic lesion is found, then CEA, CAS or mechanical recanalization of supplying artery could increase rCBF and thus to allow recovery, **but only within required time window**. If this condition doesn't exist and patient didn't reach required time window, then above mentioned therapeutic procedure can be performed only as a preventive strategy of recurrent stroke. CAS can be considered as the pioneering procedure, as one of the options. It needs sufficient supportive evidences. Without pioneers there is no progress and without trialists there is no proof. We need both, pioneers and trialists **Conclusions:** 1. CEA is the gold standard for absolute risk reduction in pts with symptomatic and asymptomatic severe ICA stenosis. It allows to improve rCBF. 2. CAS is technically feasible, simply, can be useful as preventive procedure of recurrent stroke in symptomatic stenosis. 3. Both procedures have no possibilities to contribute to brain recovery because of delayed time window.

Supported by govern. grants LPP 018606, APVV 058606 and Intrn. grant INTERREG IIIA 1414032