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Stimulation of cerebral neurogenesis with transcatheter intracerebral laser revascularization (photobiomodulation) in patients after ischemic stroke complicated by dementia

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Background: The research is devoted to cerebral neurogenesis after conducting transcatheter intracerebral revascularization with low-energy laser (photobiomodulation (PBM)) in patients with distal ischemic stroke complicated by dementia.

Materials & Methods: 797 patients 29-81 years old (mean age 74) with distal ischemic stroke of varying severity, complicated by the development of dementia, were examined: men - 598 (73.03%) and women - 199 (24.97%). Examination of cerebral CT, MRI, SG, rheoencephalography (REG), cerebral multi-gated angiography (MUGA), laboratory tests, assessment of clinical dementia rating (CDR), mini-mental state examination (MMSE), and infectious burden (IB) were done. Test group had 496 (62.23%) patients: dementia at CDR-1 level was detected in 300 (60.48%) patients, CDR-2 in 137 (27.62%), CDR-3 in 29 (5.85%) - transcatheter intracerebral PBM was conducted. Control group had 301 (37.77%) patients: dementia at CDR-1 level was detected in 183 (60.80%) patients, CDR-2 in 137 72 (23.92%), CDR-3 in 16 (5.31%) - conservative treatment was conducted including: aspirin, heparin, indirect anticoagulants, pentoxifylline, Complamin, inosine, Nootropil (piracetam), Gliatilin.

Results: The clinical outcome depends on the severity of the stroke and the timing of the treatment. Cerebral neurogenesis manifestations indicative of reparative processes were assessed by the increase in the volume of the cerebral tissue during repeated CT and MRI. Evaluation of long-term clinical outcomes (12-24 months): good clinical result - almost complete restoration of mental, cognitive functions and daily activity; satisfactory clinical result - incomplete restoration of mental, cognitive functions and daily activity; relatively satisfactory clinical result - partial restoration of mental, cognitive functions and daily activity; and relatively positive clinical result - absence of negative dynamics with insignificant restoration of mental functions and daily activity. Test group: good immediate angiographic result manifested in marked angiogenesis, collateral and capillary revascularization was obtained in 471 (94.96%) patients. In the long-term period, good clinical result was obtained in 355 (71.57%), satisfactory clinical result was obtained in 89 (17.94%), relatively satisfactory result was obtained in 52 (10.48%), relatively positive clinical result was not obtained. According to CT and MRI data, all 496 (100%) patients had a decrease in the volume of post-ischemic cysts and an increase in the cerebral tissue mass, which indicates the development of neurogenesis and the restoration of cerebral structures. Control group: In the long-term period, good clinical result was obtained in 51 (16.94%), satisfactory clinical result was obtained in 68 (22.59%), relatively satisfactory result was obtained in 115 (38.21%), relatively positive clinical result was obtained in 67 (22.26%) cases. There were no signs of neurogenesis in any case.

Conclusions: Transcatheter intracerebral laser revascularization (photobiomodulation) is an effective low-traumatic method for the treatment of ischemic strokes complicated by the development of dementia. It allows revascularization of the brain and to stimulate neurogenesis causing restoration of tissue structures. The resulting effect persists for a long time causing regression of dementia, greatly improving the quality of patients' lives.

Biography

Ivan V Maksimovich is a member of ISTAART, ESC, EAPCI, WSO, ESO and EPA. He is the Head Physician of Clinic of Cardiovascular Diseases named after Most Holy John Tobolsky (Moscow, Russia) since 1993. One of the major problems the clinic deals with is the diagnosis and treatment of various brain lesions including Alzheimer's disease. Over the past 20 years he has published over 200 scientific works on this subject.

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