

# **THE ROLE OF NEURO IMAGING METHODS FOR DETERMINING THE FORMS OF STRUCTURAL PATHOLOGY AND TACTICS FOR TREATING CEREBROVASCULAR ACCIDENTS IN ADULTS AND CHILDREN WITH CORONAVIRUS INFECTION COVID-19**

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Fundamental studies of the outstanding, world-renowned pathophysiologist professor G.I. Mchedlishvili (1966-1999) identified the main mechanisms of development of various forms of cerebral circulation disorders during hypoxia, ischemia, critical conditions of various etiologies, including those arising from infection with SARS coronaviruses. CoV, MERS-CoV and SARS-CoV-2 [1].

According to the Ministry of Health, 5935 confirmed cases of COVID-19 infection were registered in the Astrakhan region at the beginning of September 2020, the prevalence rate was 1.15. The number of patients with acute disorders of cerebral circulation (hemorrhagic, ischemic stroke) for 5 months of their register, according to preliminary estimates, did not exceed 0.5%, which corresponds to the literature data. The main contingent is persons over 50 years old with viral pneumonia, acute respiratory distress syndrome, chronic disease heart, great vessels, lungs and risk factors (immobilization, decreased saturation, intubation, mechanical ventilation, arterial hypertension, cardiac rhythm disturbances, myocardium contractility, rheology, blood clotting, activation of the process of thrombus formation, resistance to heparin and antiplatelet therapy, diabetes mellitus, obesity). The examination and treatment of patients was carried out in accordance with the “Temporary guidelines. Prevention, Diagnosis and Treatment of New Coronavirus Infection (COVID-19. Version 7, 2020) “.

The development of acute cerebrovascular accident (ACVA) can occur in the absence of clinical and laboratory markers of infection, but, most often, focal or cerebral symptoms in the form of psycho-motor agitation, confusion, loss of consciousness, tonic and / or clonic seizures occur in febrile period or against background of pneumonia in the presence of a cytokine “storm”, hyperglycemia, hyponatremia, hypercoagulation, progression of respiratory and multiple organ dysfunction syndrome. The dominant forms of cerebral dysfunction in patients with COVID-19 (adults and children) receiving treatment in intensive care units and the critical care units are hypoxic-ischemic, hemorrhagic and venous encephalopathy (pseudo-stroke) based on an analytical assessment of medical documentation received in specialized hospitals and available publications (Pub Med, Google, Scholar database).

Partial or complete occlusion of the main extracranial or intracranial vessels at different levels, instability of systemic hemodynamics are the main causes of atherothrombotic and hemodynamic subtypes of cerebral infarction in elderly and senile people.

Cardioembolic rhythm subtype regardless of age in the presence of cardiac pathology, cardiac rhythm disturbances, “mute” and accompanied by neurological deficit lacunar infarctions and “small” strokes (superficial, deep) – with arterial hypertension, cerebral small vessel disease (endothelitis, angiitis vasculocoagulopathy), hemorrhagic infarction – with thrombosis of intracerebral sinuses and veins.

Hemorrhagic complications are manifested in the form of subarachnoid, intracerebral local, multifocal or massive hemorrhage, microhemorrhages in the cortex, white matter, subcortical nodes, thalamus, corpus callosum, cerebellum, brainstem. The use of special neuroimaging protocols in patients with cerebral manifestations makes it possible to detect changes in the brain parenchyma, characteristic of acute ischemic and hemorrhagic posterior reversible encephalopathy.



It is imperative to include the CT scan of the thorax and brain organs, Doppler ultrasound, extracranial and transcranial duplex scanning of the vessels that provide blood supply to the cerebral structures when infected patients are admitted to the hospital with focal neurological symptoms, vomiting, disorientation, impaired consciousness, bilateral tonic-clonic seizures.

Spiral CT and MR angiography are more reliable methods for detecting the level and degree of occlusion, atherosclerosis, and local spasm of the cerebral arteries.

CT perfusion, MRI images (T2VI, FLAIR, PWI / DWI mismatch) are acceptable, highly sensitive and specific for assess and clarify the clinical form of ACVA, the volume / size of the focal lesion, the penumbra zone, the evolution of complications arising during conservative treatment and interventional (thrombectomy, removal of hematomas), monitoring the effectiveness of the protocols and technologies used.

Diagnosis of thrombosis of intracerebral sinuses and veins is most effectively carried out with CT or MR venography.

The use of MRI T2 \* GRE, SWAN modes is necessary for the identification of cortical, subcortical and infratentorial microhemorrhages. Their detection rate is especially high in critical encephalopathies.

Personalized therapy of patients is carried out taking into account the form of ACVA, its etiology, type and subtype of stroke in accordance with the clinical guidelines of the Ministry of Health of the Russian Federation and the European Stroke Association (ESO).

#### **Reference**

1. Belopasov VV, Yachou Y, Samoilova EM, Baklaushev VP. The Nervous System Damage in COVID-19. Journal of Clinical Practice. 2020;11(2): In Press. Doi: 10.17816/clinpract34851