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NEUROIMAGING DATA OF COVID-19 ASSOCIATED LACUNAR STROKES

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ABSTRACT: This article discusses the neuroimaging data of Covid-19 associated lacunar strokes. Determining the degree of involvement of cerebral vessels and disorders of cerebral hemodynamics in the process, the possibilities of compensation and the causes of decompensation will contribute to the real prediction of the course of the disease, the preparation of a reasonable individual rehabilitation program, the rehabilitation treatment of patients and disabled people with LS, leading to decompensation of the central nervous system, not only in the acute, but also in subsequent periods of stroke.

KEYWORDS: Neuroimaging data, Covid-19, lacunar strokes, cerebral hemodynamics, individual rehabilitation.

INTRODUCTION

The presence of COVID-19 is associated with an increase in the risk of IS by 3.58 times and in-hospital mortality by 5.60 times. COVID-19 infection increases the risk of various subtypes of stroke, especially cryptogenic stroke, which is the most severe (1,2). The pathogenesis of stroke in COVID-19 is complex and includes a number of pathophysiological mechanisms: coagulopathy, thromboembolism, vasculitis, and direct neuronal damage. Many of the pathophysiological mechanisms of COVID-19 stroke have yet to be identified, necessitating further research. Strokes in patients with COVID-19 are often characterized by a more severe course, high mortality. The occurrence of lacunar stroke with COVID-19 is relatively common in younger age groups, in individuals without any traditional risk factors for stroke. Lacunar strokes of the brain are an independent form of acute disorders of cerebral circulation and represent a heterogeneous group.

Computed (CT) and magnetic resonance imaging (MRI) can detect microfocal changes in the brain, leukoaraiosis, cerebral atrophy during life. MRI is a more sensitive method for detecting diffuse and focal brain changes compared to CT (4).

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However, the MR semiotics of LS, their differential diagnosis with other microfocal changes in the brain, the state of life and the severity of cognitive impairment (CI), especially COVID-19 associated LS, have not been fully developed and studied. Mostly, the literature deals with issues related to LS in the acute period of the clinical course, when patients are on inpatient treatment. Issues of clinical and radiation correlation outside the acute period of a vascular episode are also not well understood (3.5).

Determining the degree of involvement of cerebral vessels and disorders of cerebral hemodynamics in the process, the possibilities of compensation and the causes of decompensation will contribute to the real prediction of the course of the disease, the preparation of a reasonable individual rehabilitation program, the rehabilitation treatment of patients and disabled people with LS, leading to decompensation of the central nervous system, not only in the acute, but also in subsequent periods of stroke.

PURPOSE OF THE STUDY

Evaluation of Neuroimaging Data of COVID-19 Associated Lacunar Strokes.

Material and research methods. Taking into account the purpose and objectives of the study, in order to clarify the clinical and neuroimaging features of LS in the acute period, a comprehensive clinical and instrumental examination of 123 patients with LS was carried out, including 65 men and 58 women aged 46 to 67 years (mean age 56.8+9.9 years), who were treated in the neurological department of the City Clinical Hospital № 1 with predominantly mild organic symptoms in patients with single or multiple LS. The main group consisted of 54 patients with LS against the background of previous CVI, the comparison group consisted of 69 patients with LS who did not have a history of CVI.

In order to clarify the diagnosis and localization of the process, MRI was used - a study of the brain. The pathogenetic variant of the stroke (in our case, lacunar) was determined in accordance with the criteria proposed by the Research Institute of Neurology of the Russian Academy of Sciences (Vereshchagin N.V. et al., 2002), and with international criteria (Adams H.P. et al., 1993) necessarily with confirmation by MRI of the brain with a detailed description of the lacunar focus or foci.

The LS criteria were:

- the presence of signs of lacunar syndrome in the clinical picture during examination or according to a documented history;
- detection of an ischemic lesion (or foci) of non-cortical localization < 15 mm based on the results of neuroimaging studies, mainly MRI with a magnetic field strength of at least 1.5 T.
- no data for cardioembolic nature of stroke or ipsilateral cerebral artery stenosis > 50%.

Considering that in the vast majority of cases we made the diagnosis of LS retrospectively, in our studies we also used neuroimaging criteria developed in detail in recent years to differentiate various manifestations of cerebral microangiopathy: LS, expansion of perivascular spaces,

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leukoaraiosis, microhemorrhages (Wardlow J. et al., 2013). According to the latest criteria, the size of the LS focus according to MRI of the brain can be up to 20 mm.

Patients included in the study had undergone LS of the brain (single or multiple), confirmed by MRI of the brain at least 3 months (according to anamnesis) ago. Given the significant number of multidirectional publications concerning views on the pathogenesis, etiology, clinic, to some extent LS, in our study we analyzed cases with "classic" LS sizes (lacunae) from 0.5 to 1.5 cm, described by a neuroimaging specialist.

Magnetic resonance imaging of the brain was carried out on various devices with magnetic induction, mainly at least 1.5 Tesla. The standardized research program included, after performing localizing sections, T2-weighted, T1-weighted, FLAIR pulse sequences in three mutually perpendicular planes. At the same time, focal, diffuse changes in the medulla in their combinations were revealed. Currently, MRI is widely used in clinical practice. This method is based on the phenomenon of nuclear magnetic resonance, is highly sensitive, and is able to detect pathological foci with a diameter of 1-2 mm. It has been proven that the characteristics of the signal obtained by MRI are determined mainly by four parameters: proton density (the number of protons in the tissue under study), spin-lattice relaxation time (T1), spin-spin relaxation time (T2), movement or diffusion of structures of the nervous tissue.

Processing of the results is carried out by the methods of variational statistics with the determination of the mean and its error values (M±m), differences in the mean values, the matching criterion ($\chi 2$), and the calculation of the probability (p). The results were accepted as significant at $p<0.05$.

RESEARCH RESULTS

Of the patients examined by us, patients with multiple LI prevailed (59.% - 73 people) (Table 1). This is probably due to the fact that many of them anamnestically noted short-term episodes of a significant deterioration in their general condition with a feeling of numbness of a limb or part of it, a decrease in strength in an arm or leg, transient dizziness.

Table 1. The number of LS in the examined patients according to MRI data

Index	MG, n=54		CG, n=69		All patients, n=123	
	abc	%	abc	%	abc	%
Patients with single LS	31	57,4%	19	27,5%	50	40,7%
Patients with multiple (more	23	42,6%	50	72,5%	73	59,3%

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These phenomena quickly passed (as the surveyed claimed) and therefore they did not apply for medical help to medical institutions at that time, although they independently (or on the recommendation of the closest social environment) took drugs that affect the microcirculation of the vascular system of the brain.

When analyzing the obtained results, we found that in the MG, single LI were significantly more often found in patients of a relatively young age (from 46 to 50 years old at P<0.005 with the rest of the group of patients examined with LS). Moreover, these patients had no history of hypertension, diabetes mellitus and atherosclerosis.

According to diffusion MRI in the MG, large (more than 15 mm) or several small foci in two vascular beds were verified in 27 patients (50.0%): in one vascular bed — in 13 patients (24.1%), and the differences were not significant (p>0.05). In the SG, these figures were 34.8% and 24.6%, respectively, which reached the level of statistically significant differences with the MG (p<0.05). Among them, patients with LS of embolic origin prevailed - 11 patients (15.9%), due to hypertensive microangiopathy - 41 patients (59.4%), due to atherosclerotic microangiopathy - 10 patients (14.5%) and 7 patients (10.1%) of unknown etiology. It should be noted that in the GS multiple lesions were statistically significantly more common than in the OG subgroup (p<0.01).

CONCLUSION

Thus, taking into account the presented results, the need for an MRI study of the brain is certainly shown, since the detection of the presence of foci, in particular, even lacunar ones, will allow the attending physician to conduct the correct and indicated therapy.

REFERENCES

1. Andreev V.V., Podunov A.Yu., Lapin D.S., Gilyaeva Z.L., Nikiforova E.N., Golikov K.V., Rudenko D.I. Clinical and pathogenetic features of cerebral stroke in patients with novel coronavirus infection (COVID-19). Regional circulation and microcirculation. 2020;19(3):46-56. https://doi.org/10.24884/1682-6655-2020-19-3-46-56.
2. Voznyuk, I. A. Ischemic stroke as a clinical form and pathogenetic model in the structure of central nervous system lesions in COVID-19 [Electronic resource] / I. A. Voznyuk, O. M. Ilyina, S. V. Kolomentsev // Bulletin of restorative medicine. – 2020. – № 4. – P. 90-98.
3. Suslin, Z.A. Cerebral circulation disorders: diagnosis, treatment, prevention / Z.A. Suslina, T.S. Gulevskaya, M.Yu. Maksimova et al. - Moscow: MEDpress-inform,2016. – 256 p.
4. Shevchenko, Yu.L. Lacunar cerebral infarction / Yu.L. Shevchenko, A.N. Kuznetsov, O.I. Vinogradov. - Moscw: RANS, 2011. - 124 p.
5. Fokin, V.A. MRI in the diagnosis of ischemic stroke / V.A. Fokin, S.N. Yanishevsky, A.G. Trufanov. - St. Petersburg: ELBI-SPb., 2012 - 96 p.