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Neurological Complications of Covid-19: Focus on Acute Cerebrovascular Accidents

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Abstract: COVID-19, typically regarded as a respiratory illness, exhibits substantial neurological involvement, especially in severely affected patients. Acute cerebrovascular events, including ischemic and hemorrhagic strokes, are seen in relatively young, previously healthy individuals, linked to hypercoagulability and prothrombotic states. Neurological complications of COVID-19 may arise without direct central nervous system infection, stemming from a severe systemic reaction to the infection. Further research into the pathophysiology and clinical trials are needed to optimize strategies preventing long-term consequences and therapeutic choices.

Keywords: COVID-19; SARS-CoV-2; neurological complications; acute cerebrovascular accident; ischemic stroke; cerebral haemorrhage; cerebral vein thrombosis; hypercoagulability; thrombosis.

Introduction: Ischemic stroke remains one of the leading causes of death and disability worldwide. According to the Global Burden of Disease study, the total number of disability-adjusted life years (DALYs) due to stroke reached 143 million in 2019. Given the aging population and the increasing number of risk factors, the issue of long-term neurological and functional consequences of stroke is becoming increasingly important. Despite advances in acute therapy, such as extending the time frame for endovascular thrombectomy to 24 hours in selected cases, the need for a thorough understanding and effective management of late consequences remains a key challenge in modern neurology and rehabilitation.

METHODS

A systematic review of the literature on the topics of remote neurological consequences of ischemic stroke was conducted, including epidemiological studies, longitudinal cognitive and neuropsychological studies, data from child and adult cohorts, as well as international clinical guidelines of AHA/ASA, ESO and NICE. Inclusion criteria: publications for 2000–2023, English- and Russian-language articles, results of randomized controlled trials, cohort studies and guidelines. The search was performed in the PubMed, Scopus and eLibrary databases.

RESULTS

In 2019, the number of DALYs due to stroke was 143 million. Stroke remains the second leading cause of death and the third leading cause of disability worldwide.

Prospective study data showed that dementia affects up to 20% of patients in the acute phase and up to 39% of survivors one year after stroke. A study by Mehrabian et al. found that hippocampal atrophy is the strongest predictor of late post-stroke cognitive dysfunction.

Table 1

Prevalence of cognitive and neurological outcomes after ischemic stroke

Outcome	Group	Frequency
Dementia 1 year after stroke	Adults	39%
Moderate and severe neurological impairment 2 years later	Children	9,4%

Incidence of recurrent MI/TIA in children	Children	19%

Movement disorders and post-stroke pain significantly affect the quality of life and require a comprehensive multidisciplinary approach to rehabilitation. Psychoemotional complications, such as depression and anxiety disorders, are observed in a significant proportion of patients. In the United States, only 30.7% of stroke survivors received outpatient rehabilitation. In three Korean hospitals, 27.9% of patients received rehabilitation counseling, 12.9% were transferred to rehabilitation departments.

Table 2

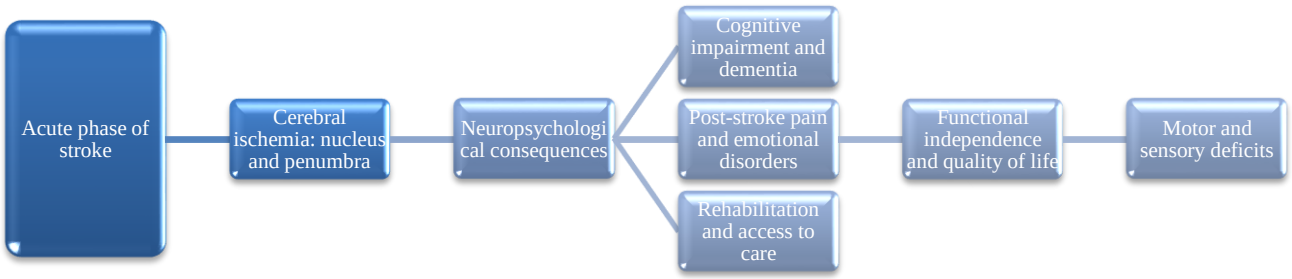
Access to rehabilitation in patients after ischemic stroke

Type of rehabilitation	Population	Percentage
Outpatient rehabilitation	Stroke Survivors	30,7%
Rehabilitation consultation	First Discharges from Three Korean Hospitals	27,9%
Transfer to the rehabilitation department	First Discharges from Three Korean Hospitals	12,9%

DISCUSSION

The results of the review confirm a significant level of cognitive and neurological impairment in the late period after ischemic stroke in adults and children. The high incidence of dementia and motor deficits emphasizes the importance of early risk identification and development of effective rehabilitation strategies. Despite the proven benefits of extended thrombectomy and telestroke networks for delivery of acute care, many patients face limited access to rehabilitation services.

The 2018 AHA/ASA Guidelines, partially revised and supplemented after the removal of a number of sections, emphasize the need for an individualized approach and multifactorial outcome assessment. International ESO and NICE guidelines also focus on continuous rehabilitation and monitoring of cognitive status.



Scheme 1. Pathogenetic stages of development and remote outcomes of ischemic stroke

CONCLUSION

Stroke remains the leading cause of DALYs worldwide. Dementia occurs in 39% of survivors one year after stroke. In children, 9.4% have moderate to severe neurological impairment at two years; recurrent MI/TIA reaches 19%. Only 27.9% of patients receive rehabilitation consultations and 12.9% are transferred

to rehabilitation units during their first hospitalization; 30.7% of survivors receive outpatient rehabilitation.

Extension of the time frame of endovascular thrombectomy to 24 hours has improved access to acute therapy. Further research should be aimed at improving the quality and availability of rehabilitation, developing personalized neuroprotection programs and introducing modern technologies for monitoring and supporting patients in the late period after stroke.

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