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A clinical case of co-occurring mental disorder and coronavirus infection

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ABSTRACT

In the new millennium, humanity has faced with a global challenge in the form of the novel coronavirus infection (COVID-19). In addition to systemic and respiratory symptoms, SARS-CoV-2 causes neurological disorders, as it is a neurotropic virus. Many scientists assume that SARS-CoV-2 can enter the nervous system through the functional receptor of angiotensin-converting enzyme 2, which is present in glial cells, neurons, skeletal muscles, and other organs. Neurological complications are manifested by damage to the central nervous system, peripheral nervous system, and cranial nerves, as well as by mental disorders. Mental illnesses develop due to neuroinflammation and neuronal death after brain infection with SARS-CoV-2.

The article describes a clinical case of a 63-year-old man with the co-occurring novel coronavirus infection and obvious mental disorder who has never had any mental illnesses before. The given clinical example demonstrates the importance of studying the cause-and-effect relationship between COVID-19 and mental illness. In the medium- and long-term perspective, COVID-19 is expected to result in mental health disorders during COVID-19 recovery. Besides, an increase in the number of patients with mental disorders who were mentally healthy before COVID-19 infection is also expected.

Keywords: SARS-COV-2, COVID-19, coronavirus, mental illnesses, mental disorders

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Клинический случай психического расстройства на фоне новой коронавирусной инфекции

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РЕЗЮМЕ

В новом тысячелетии человечество столкнулось с глобальной проблемой – новой коронавирусной инфекции COVID-19, вызванной вирусом SARS-CoV-2. Помимо системных и респираторных симптомов, вирус SARS-CoV-2 вызывает неврологические расстройства, так как обладает нейротропностью. Многие ученые предполагают, что SARS-CoV-2 способен проникать в нервную систему через функциональный рецептор ангиотензин-превращающего фермента 2, который присутствует в глиальных клетках, нейронах, скелетных мышцах и других органах. Осложнения со стороны нервной системы проявлялись поражениями различных структур: центральной нервной системы, периферической нервной системы и черепно-мозговых нервов, а также психическими расстройствами. Психические заболевания развиваются вследствие нейровоспаления и гибели нейронов после заражения мозга SARS-CoV-2.

Описан клинический случай новой коронавирусной инфекции у мужчины 63 лет с впервые выявленным психическим расстройством. Приведенный клинический пример демонстрирует важность изучения причинно-следственной связи между COVID-19 и психическим заболеванием. В среднесрочной и долгосрочной перспективе ожидается, что COVID-19 приведет к проблемам психического здоровья в период постковидного восстановления, также ожидается увеличение количества пациентов с психическими расстройствами, которые были психически здоровы до заражения COVID-19.

Ключевые слова: SARS-COV-2, COVID-19, коронавирус, психические заболевания, психические расстройства

Конфликт интересов. Авторы декларируют отсутствие явных и потенциальных конфликтов интересов, связанных с публикацией настоящей статьи.

Источник финансирования. Авторы заявляют об отсутствии финансирования при проведении исследования.

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INTRODUCTION

The coronavirus infection (COVID-19) is a global public health emergency which has a great impact on mental health. To date, it has been determined that COVID-19 affects not only the lungs, but also cells of the central nervous system. Data on the SARS-CoV-2 neuroinvasion [1–3] and neuropsychiatric consequences of the disease caused by it are increasing [4]. It is known that 0.9–4% of infected people develop psychotic spectrum disorders. The link between COVID-19 and mental illness has been established by many observational studies, but a causal relationship cannot yet be reliably detected.

M. Taquet et al. [5] found that the first psychiatric diagnosis is more common in patients with COVID-19 within 14–90 days after the first COVID-19 symptoms, and a psychiatric diagnosis may be an independent risk factor for COVID-19. The scientists expand their findings by assessing the incidence rates and relative risks of 14 neurological and psychiatric diagnoses in patients within 6 months after COVID-19 was diagnosed. Cerebral edema and partial neurodegeneration were described in post-mortem reports, which indicates that the virus might contribute to the development of acute psychiatric symptoms and long-term psychoneurological consequences of COVID-19.

Neuropsychiatric conditions are accompanied by profound changes in the morphology and function of microglia, leading to the secretion of proinflammatory cytokines. Meanwhile, aberrant phagocytosis affects neural circuits. Conceptually, long-term disruption of neuroglial function ultimately affects synaptic integrity, the excitation – inhibition balance, and information processing, making a fundamental contribution to the pathogenesis of neuropsychiatric disorders. J. Rogers et al. suggest that emerging neuropsychiatric manifestations may be due to brain exposure to the virus, indirect immune responses or ongoing treatment [6]. However, mental disorders developing at the acute stage of the disease may arise due to fears about the consequences of the disease, such

as social isolation and quarantine [7], unemployment, financial difficulties [8], and stigma [9].

CLINICAL CASE

Patient A., 63 years old, was admitted to a repurposed inpatient hospital for infectious diseases in Aktobe in April 2021. The patient complained of dyspnea on exertion, cough, insomnia, lower quality of sleep, absence of taste and smell, fever up to 39˚C, and severe generalized weakness.

According to the medical history, the patient was diagnosed with hypertension and coronary heart disease. The patient regularly takes lisinopril 5 mg, atorvastatin 20 mg, acetylsalicylic acid + magnesium hydroxide 75 mg. Bad habits include smoking for 35 years, half a pack a day.

From the anamnesis vitae: no mental illnesses in the family history. The patient grew and developed according to his age.

The objective examination findings: severe general condition, lucid, normal physique. Body temperature is up to 38–39 ºC. The pharynx is hyperemic, moist. The heart rate is 97 beats per minute (tachycardia), the blood pressure is 160 / 90 mm Hg. Saturation level is 91% in room air. A nasopharyngeal PCR swab for SARS-CoV-2 is positive. Breathing is weakened in the lower parts of the lungs, small bubbling and moist rales are heard on auscultation. The respiratory rate is 22–24 breaths per minute.

The laboratory tests: C-reactive protein – 80 mg / l (normal range < 10 mg / l), D-dimer – 980 mg / l (< 250 mg / l), ferritin – 216 µg / ml, interleukin (IL) – 11.6 pg / ml, other inflammatory markers were within the normal range. The complete blood count: lymphopenia – 9%, thrombocytopenia – 156 / l, leukocytosis – 19 / l, creatinine – 157.0 µmol / l, urea – 15 mmol / l. Chest X-ray revealed bilateral polysegmental pneumonia.

The mental state of the patient at admission was characterized by fussiness, anxiety, and motor restlessness. The patient was admitted to the infectious disease hospital on the 11th day from the disease onset. On the 4th day of hospital stay, due to a change in his mental state characterized by agitation, aggressive behavior, and insomnia, the patient was examined by a psychiatrist and a neurologist. During the examination, the patient complained of insomnia, anxiety, and fear for his life, repeated that “everyone will die from the coronavirus, the Chinese are to blame, they want to kill us, Nazarbayev and Tokayev betrayed me, they made a mistake, they committed a sin, all of us are in danger”. When asked by doctors, he said that “death has come, we must face it with dignity”, and asked the neighbors in the ward to bathe and dress in clean clothes. During the 4 days of hospital stay, he became uncommunicative, secluded himself, behaved suspiciously, declared that the end of the world would come soon, “the spirit of the deceased brother wants to take his soul”. In the last two nights, he did not sleep, it seemed to him that “the devil came to take his soul”. He started calling the Ministry of Emergency Situations and President Vladimir Putin using a mobile phone.

The mental status: lucid, untidy looks, contactable, tense, suspicious, anxious, without a sense of distance, speech in the form of a spontaneous monologue. During the conversation, he jumped up from his chair, went out into the corridor, came to the windows, then returned and said: “The Chinese are to blame, they want to kill us, Nazarbayev and Tokayev betrayed me, they made a mistake, they committed a sin, all of us are in danger”. He did not reveal painful experiences, stayed in the world of worries and concerns. He looked around, listened, sometimes smiled to himself. Thinking was inconsistent, paralogical, accelerated. His behavior was characterized by motor restlessness and impulsiveness with signs of severe emotional instability. Intellectual mnestic functions were not greatly affected despite the limited range of interests. The clinical presentation of acute psychosis was dominated by a severe affective delusional disorder and the inability to critically assess his condition. The patient was diagnosed with organic delusional disorder.

The neurological status: no focal neurological symptoms were detected.

CONCLUSION

Therefore, some of the neurological complications of COVID-19 are mental disorders. Patients with a concomitant pathology are at risk for severe COVID-19. Severe hypoxia and hypoxic encephalopathy are manifested by diffuse brain damage and death of its cells. Some patients may develop severe delirium, others – encephalopathy, drowsiness, and impaired consciousness.

This patient had an increased immune response. High levels of IL-6 indicate a decrease in body immunocompetence. The host immune response to the SARS-CoV-2 infection and possible direct viral infections of the central nervous system are potential mechanisms that can cause neuropsychiatric

consequences [10]. Proinflammatory cytokines are known to cause axon degeneration by changing the activity of neurons and glia. That will change the mental status and lead to neurocognitive disorders, headache, encephalitis, myelitis, stroke, myopathy, Guillain – Barré syndrome and polyneuropathies [11]. Systemic inflammation exacerbates cytokine-mediated brain damage and hematogenous spread of SARS-CoV-2 into the brain [12].

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