



Coronavirus in patient with positive PCR test in cerebrospinal fluid led to generalized tonic-clonic seizure without brain lesion: a case report

ARTICLE INFO

Article Type

Original Research

Authors

Davood Shalil Ahmadi¹,
 Mohammad Reza Sobouti²,
 Mohammad Momeni³,
 Kowsar Bavarsad^{4,5},
 Samireh Ghafouri^{4,5}

1. Department of Neurology, Golestan Hospital, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
2. Faculty of Medical Science, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
3. Advanced Diagnostic and Interventional Radiology Research Center, Tehran University of Medical Sciences, Tehran, Iran
4. Department of Physiology, Faculty of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
5. Persian Gulf Physiology Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

*Corresponding authors:

Samireh Ghafouri, Department of Physiology, Faculty of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz

samireh.ghafouri@gmail.com

ABSTRACT

Background:

SARS-CoV-2 which first was observed in Wuhan region, China in December 2019 is affected many organs, such as central nervous system. We describe a case of a 57-year-old male patient, in hospital with the loss of consciousness, in the form of lack of verbal and visual communication. He got a seizure attack for about 3 minutes in the form of generalized tonic-clonic seizure (GTS) and admitted to the neurological department and was intubated. Since, the patient was not aware, awake, did not obey, corneal reflexes test was positive and his pupils were isochoric and reactive therefore, the primary diagnosis was cerebrovascular accident (CVA). On the second day after admission, although the brain computed tomography (CT) did not show brain lesion, but chest X-ray (CXR) revealed lung involvement. In addition, on third day the RT-PCR test for coronavirus RNA in and the cerebrospinal fluid and nasopharyngeal swap done and the result was positive for both of them. Therefore, treatment for the covid-19 was started.

Results:

Since, the treatment for the covid-19 was started with Atazanavir, Clindamycin and ceftriaxone, ten days after hospitalization, the lung involvement and general condition of patient got better and after two weeks he was released from the hospital.

Conclusion:

GTS should be considered as a neurological outcome of COVID-19 and medications against the coronavirus, such as Atazanavir, Clindamycin and ceftriaxone can recover the neurological deficits in these patients.

Key words: COVID-19, Cerebrospinal fluid, Lumbar puncture, Central nervous system

Introduction

SARS-CoV-2 first was observed in Wuhan region, China in December 2019. At the beginning of the pandemic, the common symptoms were limited to the respiratory system and cytokine storm such as fever, dry cough, respiratory failure. As the number of coronavirus disease 2019 (covid-19) patients grows, special cases are becoming more evident. Among these unexpected symptoms, neurological complications including seizure, stroke, loss of consciousness, anosmia have been discussed in many articles.

Case presentation

A 57-year-old male patient, presented with loss of consciousness, in the form of lack of verbal and visual communication to Golestan hospital on 23/10/2020 and during the admission he got a seizure attack for about 3 minutes in the form of generalized tonic-clonic seizure (GTC). According to the patient's companion, he had left-sided hemiparesis from first day of hospitalization without fever. His past medical history did not present the sign of special disease, except the appendectomy and intestinal adhesion for two times, 10 years ago. The patient was smoker with 37°C body temperature, heart beat 110 B/min, blood pressures 130/80 mmHg and respiratory rate 17 times per minute. On systemic physical examination nothing was found and he admitted to the neurological department and was intubated.

During neurological examination, the patient was not aware, awake and did not obey. In addition, his pupils were isochoric and reactive. Moreover, doll's eye maneuver and corneal reflexes test were positive. Cranial nerves did not have any disorder and facial sense was not measurable. In addition, with painful stimulation the patient localized the right limbs and extended the left limbs. Taken together, considering the described symptoms, the primary diagnosis was cerebrovascular accident (CVA).

His electroencephalogram (EEG) was normal and on the second day of admission he was submitted to the brain computed tomography (CT) and chest X-ray (CXR). The brain CT did not show any lesion and CXR revealed lung involvement. Therefore, due to the fever presentation, the lung

counseling was ordered and appropriate antibiotics were prescribed.

On the third day following admission, because the body temperature increased and due to the loss of consciousness, the patient candidate for lumbar puncture (LP) and the RT-PCR test for coronavirus RNA in cerebrospinal fluid (CSF) was positive. Then, the RT-PCR test for coronavirus RNA in nasopharyngeal swap was done and the result was also positive. Therefore, treatment for the covid-19 was started with Atazanavir, Clindamycin and ceftriaxone.

Discussion

Since primary emergence of the SARS-CoV-2, the virus has developed formerly unexpected features, like neurological disorders [1, 2]. Sometimes these symptoms are the first symptoms of the patient and sometimes they are secondary to the covid-19. Headache, stroke, GBS, encephalopathy and meningo-encephalitis are among these features [1, 2].

The certain damaging mechanism of CNS by SARS-CoV-2 is still unknown. However, there are several hypotheses. One of which is that, SARS-CoV-2 penetrate directly into the CNS haematogenously, lymphatically or through retrograde transsynaptic pathway from peripheral nerve endings [3, 4]. Second hypothesis suggests the indirect pathogenesis of brain due to cytokines release and respiratory failure complication [4]. Furthermore, there are some evidences which indicated, blood brain barrier (BBB) is damaged in the covid-19 patients with neurological manifestations which it increases the risk of the process of stroke and other complications [1-4]. Considering, the sequences of symptoms, no alterations in patient's hemodynamic status and lack of fever, it is more probable that the virus penetrated into the CNS through retrograde pathway. Also due to normal temperature at the time of GTC occurrence, the storm cytokine is less possible to cause the neurological complications in this patient. In addition, his history expressed that, he first had left-sided hemiparesis and subsequently the loss of consciousness and eventually seizure attack which brought up stroke diagnosis.

Stroke has been discussed as one of the main neurological complications of COVID-19 [2, 5-7] and a case series study in Italy, it was shown that

the stroke in the covid-19 patients can be either ischemic or hemorrhagic [7]. Recent clinical findings have revealed that, the stroke in the covid-19 patients might be due to hypercoagulopathy status. This situation is as a result of damaging to the endothelial cells, activating inflammatory and thrombotic pathway [5]. however, in this case, despite of presence of stroke evidences, CT-brain did not show any detail of stroke for three days in a row.

Seizure also is another noteworthy symptom in this case. For seizure there is no certain mechanism. However, some pathologic processes have been postulated in the covid-19 patients. One of which, represents cytokine release induces neuronal sensitivity, mitochondrial dysfunction and hyper-coagulation situation in the brain, which leads to post-ischemic seizure. Another mechanism is BBB disruption and subsequent imbalanced homeostasis. Furthermore, in covid-19 patients, the observed electrolyte disorder can speed up the seizure process [8, 9].

In addition, in recent studies, almost all COVID-19 patients with neurological complications, had negative PCR for SARS-CoV-2 RNA in CSF specimen which supports the indirect CNS invasion by BBB disruption and cytokine release, but in the aforementioned case PCR test was positive that strengths the direct pathologic hypothesis [8, 10].

Conclusion

GTS should be considered as a neurological outcome of COVID-19 and medications against the coronavirus, such as Atazanavir, Clindamycin and ceftriaxone can recover the neurological deficits in these patients. Therefore, considering the pathogenesis of the neurological deficits and using antiviral drugs can conduct us to overcome these problems.

Conflict of Interest Statement

The authors declare that there are no conflicts of interest.

Acknowledgement

This study was supported by Ahvaz Jundishapur University of Medical sciences.

References

- [1] 1. Koralnik, I.J. and K.L. Tyler, *COVID-19: A Global Threat to the Nervous System*. Ann Neurol, 2020. **88**(1): p. 1-11.
- [2] 2. Romero-Sanchez, C.M., et al., *Neurologic manifestations in hospitalized patients with COVID-19: The ALBACOVID registry*. Neurology, 2020. **95**(8): p. e1060-e1070.
- [3] 3. Bohmwald, K., et al., *Neurologic alterations due to respiratory virus infections*. Frontiers in cellular neuroscience, 2018. **12**: p. 386.
- [4] 4. Carod-Artal, F.J., *Neurological complications of coronavirus and COVID-19*. Rev Neurol, 2020. **70**(9): p. 311-322.
- [5] 5. Ellul, M.A., et al., *Neurological associations of COVID-19*. Lancet Neurol, 2020. **19**(9): p. 767-783.
- [6] 6. Li, Y., et al., *Acute cerebrovascular disease following COVID-19: a single center, retrospective, observational study*. Stroke Vasc Neurol, 2020. **5**(3): p. 279-284.
- [7] 7. Morassi, M., et al., *Stroke in patients with SARS-CoV-2 infection: case series*. J Neurol, 2020. **267**(8): p. 2185-2192.
- [8] 8. Miller, E.H., et al., *Cerebrospinal Analysis in Patients With COVID-19*. Open Forum Infect Dis, 2020. **7**(11): p. ofaa501.
- [9] 9. Nikbakht, F., A. Mohammadkhanizadeh, and E. Mohammadi, *How does the COVID-19 cause seizure and epilepsy in patients? The potential mechanisms*. Multiple sclerosis and related disorders, 2020: p. 102535.
- [10] 10. Bellon, M., et al., *Cerebrospinal Fluid Features in Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Reverse Transcription Polymerase Chain Reaction (RT-PCR) Positive Patients*. Clinical Infectious Diseases, 2020.