

2. Wu F, Zhao S, Yu B, Chen Y-M, Wang W, Song Z-G, et al. A novel coronavirus associated with human respiratory disease in China. *Nature*. 2020;579:265–9.
3. Real Decreto 463/2020, de 14 de marzo, por el que se decreta el estado de alarma para la gestión de crisis sanitaria ocasionada por el COVID-19.
4. Acuerdo de 13 de marzo de 2020, del Consejo de Gobierno, por el que se toma en consideración la Orden de la Consejería de Salud y Familias, por la que se adoptan medidas preventivas en Salud Pública en la Comunidad Autónoma de Andalucía como consecuencia de la situación y evolución del coronavirus (COVID-19) (BOJA extraordinario num 6-Sábado 14 de marzo de 2020).
5. Huan C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with a novel coronavirus in Wuhan, China. *Lancet*. 2020;395:497–506.
6. Zhao H, Shen D, Zhou H, Liv J, Cheng S. Guillain-Barré syndrome associated with SARS-CoV-2 infection: casualty or coincidence. *Lancet Neurol*. 2020;19:383–4, [http://dx.doi.org/10.1016/S1474-4422\(20\)30109-5](http://dx.doi.org/10.1016/S1474-4422(20)30109-5).
7. Poyradji N, Shahin G, Noujaim D, Stones M, Pitel S, Griffith B. COVID-19-associated Acute Hemorrhagic Necrotizing encephalopathy: CT and MRI features. *Radiology*. 2020, <http://dx.doi.org/10.1148/radiol.2020201187>.
8. Terry K. US hospitals facing severe challenges from COVID-19, HHS reports says. *Medscape*. April 6, 2020.
9. Matías-Guiu J, Porta-Etessam J, López-Valdés E, García-Morales I, Guerrero-Solá A, Matías-Guiu JA. La gestión de la asistencia neurológica en tiempos de la pandemia de COVID-19. *Neurología*. 2020, <http://dx.doi.org/10.1016/j.nrl.2020.04.001>.
10. Helms J, Kremer S, Merdji H, Clere-Jehl R, Schenck M, Kummerlen C, et al. Neurological features in severe SARS-CoV-2 infection. *N Engl J Med*. 2020, <http://dx.doi.org/10.1056/NEJMc2008597>.
11. Mao L, Wang M, Chen S, He Q, Chang J, Hong C, et al. Neurological manifestations of hospitalized patients with COVID-19 in Wuhan, China: a retrospective case series study. *medRxiv*. 2020, <http://dx.doi.org/10.1101/2020.02.22.20026500>.
12. Palasca O, Santos A, Stolte C, Gorodkin J, Jensen LJ. *TISSUES 2.0: an integrative web resource on mammalian tissue expression*. Database. 2018. No. bay003.
13. Netland J, Meyerholz DK, Moore S, Cassell M, Perlman S. Severe acute respiratory syndrome coronavirus infection causes neuronal death in the absence of encephalitis in mice transgenic for human ACE2. *J Virol*. 2008;82:7264–75.
14. Li YC, Bai WZ, Hashikawa T. The neuroinvasive potential of SARS-CoV2 may be at least partially responsible for the respiratory failure of COVID-19 patients. *J Med Virol*. 2020, <http://dx.doi.org/10.1002/jmv.25728>.

F.J. Hernández Ramos\*, A. Palomino García,  
M.D. Jiménez Hernández

*Unidad de Neurosistémicas, Unidad Clínica de Neurología y Neurofisiología, Hospital Universitario Virgen del Rocío, Sevilla, Spain*

\* Corresponding author.

E-mail address: [currohernandez@gmail.com](mailto:currohernandez@gmail.com)

(F.J. Hernández Ramos).

<https://doi.org/10.1016/j.nrleng.2020.04.008>  
2173-5808/

© 2020 Sociedad Española de Neurología. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Report of a patient with neurological symptoms as the sole manifestation of SARS-CoV-2 infection<sup>☆</sup>



### Paciente con clínica neurológica como única manifestación de infección por SARS-CoV-2

Dear Editor:

The typical symptoms associated with SARS-CoV-2 infection have been described extensively in the literature<sup>1,2</sup>; however, the advance of the epidemic is revealing a broader spectrum of clinical manifestations. While neurological symptoms are common over the course of SARS-CoV-2 infection,<sup>3</sup> they have not yet been well defined. We present

the case of a 30-year-old woman with no relevant medical or surgical history who presented neurological symptoms as the sole manifestation of SARS-CoV-2 infection.

The patient consulted due to a sensation of instability and loss of balance of 48 hours' progression. Symptoms were accompanied by nausea and vomiting and significantly worsened when she stood; she was unable to walk unassisted. Three weeks earlier, she had presented anosmia and ageusia, lasting 10 days. She reported no headache, hypoacusia, tinnitus, sensation of fullness in the ear, fever, cough, dyspnoea, or diarrhoea. She had not used any drugs or ototoxic medications, or suffered recent head trauma.

Haemodynamic and respiratory vital signs were normal. Higher cognitive functions were intact. Physical examination revealed persistent, purely horizontal, right-beating nystagmus, which was more pronounced with rightward gaze and accompanied by oscillopsia. The head impulse test could not be evaluated due to the appearance of saccades associated with the nystagmus. The alternate occlusion test revealed no deviation. The patient presented positive Romberg sign, falling backward, and was unable to walk in tandem. No auricular lesions were observed. No other relevant findings were observed in the neurological or physical examination.

<sup>☆</sup> Please cite this article as: Escalada Pellitero S, Gargiga Ferrer-Bergua L. Paciente con clínica neurológica como única manifestación de infección por SARS-CoV-2. *Neurología*. 2020;35:271–272.

PCR results were positive for SARS-CoV-2, and blood analysis revealed mild lymphocytopenia ( $1000\text{ cells/mm}^3$ ), D-dimer level of  $2270\text{ ng/mL}$ , fibrinogen level of  $326\text{ mg/dL}$ , LDH level of  $235\text{ U/L}$ , and C-reactive protein level of  $1.2\text{ mg/L}$ .

In the light of the atypical nystagmus detected in the HiNTS (Head-Impulse, Nystagmus, Test-of-Skew) plus exam and the inability to evaluate the head impulse test, and given the hypercoagulable state described in cases of COVID-19,<sup>4</sup> we performed a contrast-enhanced brain MRI study to rule out central structural lesions as a cause of vestibular dysfunction. A chest CT angiography was also performed to rule out pulmonary embolism. Neither study revealed any abnormalities.

Having ruled out other possible aetiologies, we established a diagnosis of acute vestibular dysfunction probably due to SARS-CoV-2 infection.

Clinical and laboratory parameters progressed favourably with symptomatic treatment (antiemetic drugs and vestibular sedatives), hydroxychloroquine, and low-molecular-weight heparin.

Our patient's neurological symptoms are compatible with those described in the only case series published to date on neurological manifestations of COVID-19.<sup>3</sup> In that study, the central nervous system was most frequently affected, with dizziness being the most common symptom. The main peripheral nervous system symptoms were anosmia and ageusia, which have already been reported in past studies.<sup>5,6</sup> According to Mao et al.,<sup>3</sup> onset of neurological symptoms occurs early in the course of the disease. Anosmia and ageusia may have been these early symptoms in our patient.

However, our patient is younger than the mean age of patients with neurological manifestations in the study by Mao et al.<sup>3</sup> Also, respiratory tract and gastrointestinal symptoms of varying intensity seem to be a constant feature in patients with neurological symptoms and SARS-CoV-2 infection<sup>3</sup>; our patient presented none of the typical symptoms,<sup>1,2</sup> with neurological symptoms being the sole manifestation of the infection.

The pathogenic mechanisms leading to neurological involvement in patients with SARS-CoV-2 infection are not well defined, but may resemble those of such other coronaviruses as SARS-CoV and MERS-CoV, invading the central nervous system via the haematogenous or retrograde neuronal pathways, which would explain the peripheral nervous system involvement.<sup>3,7</sup> It has also been suggested that the virus may spread locally across the ethmoid cribriform plate.<sup>8</sup> The clinical course observed in our patient suggests that the virus may have accessed the nervous system directly by crossing the olfactory epithelium, as she first presented anosmia and subsequently vestibular symptoms; this is compatible with the hypothesis proposed by Matias-Guiu et al.<sup>8</sup> and Butowt et al.<sup>7</sup>

We should be aware that neurological symptoms may present as the sole manifestation of SARS-CoV-2 infection. It is essential to ensure early diagnosis of the infection in patients with acute neurological symptoms in the context of an epidemic in order to take actions to prevent the transmission of the disease; nonetheless, we should continue to follow the usual approach to diagnosis and treatment.

## References

1. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *JAMA*. 2020;323:1061–9. <http://dx.doi.org/10.1001/jama.2020.1585>.
2. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, et al. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med*. 2020. <http://dx.doi.org/10.1056/NEJMoa2002032>.
3. Mao L, Jin H, Wang M, Hu Y, Chen S, He Q, et al. Neurologic manifestations of hospitalized patients with coronavirus disease 2019 in Wuhan, China. *JAMA Neurol*. 2020. <http://dx.doi.org/10.1001/jamaneurol.2020.1127>.
4. Han H, Yang L, Liu R, Liu F, Wu KL, Li J, et al. Prominent changes in blood coagulation of patients with SARS-CoV-2 infection. *Clin Chem Lab Med*. 2020. <http://dx.doi.org/10.1515/cclm-2020-0188>.
5. Giacomelli A, Pezzati L, Conti F, Bernacchia D, Siano M, Oreni L, et al. Self-reported olfactory and taste disorders in SARS-CoV-2 patients: a cross-sectional study. *Clin Infect Dis*. 2020. <http://dx.doi.org/10.1093/cid/ciaa330>.
6. Gane SB, Kelly C, Hopkins C. Isolated sudden onset anosmia in COVID-19 infection. A novel syndrome? *Rhinology*. 2020. <http://dx.doi.org/10.4193/rhin20.114>.
7. Butowt R, Bilinska K. SARS-CoV-2: olfaction, brain infection, and the urgent need for clinical samples allowing earlier virus detection. *ACS Chem Neurosci*. 2020. <http://dx.doi.org/10.1021/acscchemneuro.0c00172>.
8. Matias-Guiu J, Gómez-Pinedo U, Montero-Escribano P, Gómez Iglesias P, Porta-Etessam J, Matias Guiu JA. ¿Es esperable que haya cuadros neurológicos por la pandemia por SARS-CoV-2? *Neurología*. 2020. <http://dx.doi.org/10.1016/j.nrl.2020.03.001>.

S. Escalada Pellitero<sup>a,\*</sup>, L. Garriga Ferrer-Bergua<sup>b</sup>

<sup>a</sup> *Servicio de Pediatría, Hospital Infantil Universitario Niño Jesús, Madrid, Spain*

<sup>b</sup> *Servicio de Pediatría, Hospital Universitario Infanta Sofía, Madrid, Spain*

\* Corresponding author.

*E-mail address:* [sescaladap@hotmail.com](mailto:sescaladap@hotmail.com) (S. Escalada Pellitero).

<https://doi.org/10.1016/j.nrleng.2020.04.009>  
2173-5808/

© 2020 Sociedad Española de Neurología. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).