

Chorea as a Post-COVID-19 Complication

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Severe acute respiratory syndrome (SARS) coronavirus (COV)-2 causes flu-like symptoms, including fever, cough, fatigue, and loss of sense of smell. Although many complications of this unprecedented virus have been specified, there is still a lack of information on neurologic post-recovery complications. Studies suggest that this rapidly spreading virus can invade the nervous system and cause neurological problems even after recovery.¹ The most common neurological complications include headache, dizziness, myalgia, anosmia, gustatory, and olfactory dysfunctions.² Severe disorders such as encephalopathy, encephalitis, necrotizing hemorrhagic encephalopathy, stroke, epileptic seizures, rhabdomyolysis, and Guillain-Barre syndrome have also been reported after coronavirus disease (COVID)-19 infection.³ There are just six case reports on post-COVID-19 chorea. As far as we know, the two patient cases noted below are the first to be reported with more than a 2-week interval between post-COVID-19 encephalitis and initiation of chorea.⁴⁻¹¹

A 67-year-old woman was referred to the movement disorder clinic because of acute onset of generalized choreiform movements. She stated an earlier admission because of coronavirus symptoms including nausea, loss of appetite, and high blood pressure 3 months prior. Moreover, she tested positive for coronavirus reverse-transcription polymerase chain reaction (RT-PCR) by nasopharyngeal swab. Additionally, 2 weeks after the beginning of her COVID-19 infection, she developed confusion, illusion, aphasia, imbalance, and delirium. Consequently, she was diagnosed with post-COVID-encephalitis and received a tocilizumab injection. She was vaccinated for COVID-19 (AstraZeneca) 4 months previously. Her family history and previous history of any abnormal movements in any part of her body were negative.

She had normal neurological and systemic examinations. However, she was suffering from choreiform movements in her face and all four limbs, with right arm dominance (Video 1). Brain magnetic resonance imaging (MRI) showed bilateral hyperintensity on fluid-attenuated inversion recovery and T2 imaging on basal ganglia (Fig. 1). She was treated with

tetrabenazine (12.5 mg twice daily). After a few days, her symptoms recovered rapidly, and she was discharged.

Another 62-year-old otherwise healthy female presented to the movement disorder clinic because she experienced sudden onset abnormal movements in her truncal and limbs. She had been admitted 15 days previously because of her COVID-19 infection and treated with a remdesivir injection. Her past medical history, drug history, and family history were unremarkable. She had no pathological findings in examinations and brain MRI. Nonetheless, she had choreiform movements on her extremities, especially on the right side (Video 2). She was treated with tetrabenazine and chorea dramatically mended.



Video 1. Shows the patient with choreiform movements in face and all four limbs, more prominently in the right upper extremity.

Video content can be viewed at <https://onlinelibrary.wiley.com/doi/10.1002/mdc3.13557>

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Keywords: chorea, choreiform movements, COVID-19, coronavirus.
Relevant disclosures and conflict of interest are listed at the end of this article.
Received 5 May 2022; revised 27 July 2022; accepted 13 August 2022.

Published online 18 September 2022 in Wiley Online Library (wileyonlinelibrary.com). DOI: 10.1002/mdc3.13557

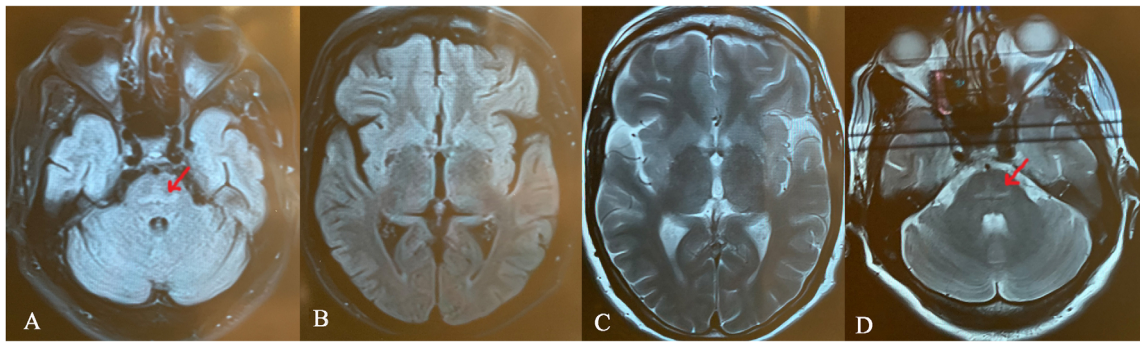


FIG 1. Axial fluid-attenuated inversion recovery (FLAIR) and T2 brain magnetic resonance imaging (MRI) shows hyperintensity of basal ganglia and pons.



Video 2. Shows the patient with chorea in all four limbs. Video content can be viewed at <https://onlinelibrary.wiley.com/doi/10.1002/mdc3.13557>

In both cases, laboratory tests including complete blood count, basic metabolite assessment (sodium, potassium, calcium, chloride, carbon dioxide, albumin, blood urea nitrogen, and fasting blood sugar), lipid panel, liver-thyroid function tests, and paraneoplastic panels were found to be at normal ranges. However, there was an increase in erythrocyte sedimentation rate and C-reactive protein levels in case 2. Accordingly, chorea was considered to be a complication of COVID-19 infection.

Societies have been greatly affected by COVID-19 consequences. These complications need to be elucidated. As mentioned earlier, neurologic complications after COVID-19 infection have been stated before. Here, we report two women with right dominant choreiform movements that, unlike other reports, showed chorea after 2 weeks from COVID-19 infection.

Literature that includes choreiform movements after coronavirus infection, published up to March 2022, was reviewed (Table 1). Subsequently, the relevant six case reports were extracted. We included our case report on hemichorea after the BBIBP-CorV (Sinopharm) vaccine.¹² Although this is a rare condition, clinicians must be conscious of this possible outcome.

Author Roles

(1) Research project: A. Conception, B. Organization, C. Execution. 2 Manuscript: A. Writing of the First Draft, B. Review and Critique.

F.A.: 1A, 1B, 1C.

M.S.:1A, 1B, 1C, 2A.

F.H.P.: 2A.

Disclosures

Ethical Compliance Statement: This study was reviewed by Shahid Beheshti University of medical sciences. The patients have given written and informed consent for online publication of their videos. We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this work is consistent with those guidelines.

Funding Sources and Conflicts of Interest: The authors declare that there are no conflicts of interest relevant to this work.

TABLE 1 Presentation of available case reports

Author	Patient	Clinical features	Symptoms onset day*	CSF	Lab tests	History	Brain CT/MRI	Treatment
Yüksel et al ⁹	14 yr F	Bilateral shoulder shrugging, choreiform movements in all four limbs and bilateral milkmaid's grip sign	3	NA	Iron deficiency anemia	Sydenham's chorea	Normal	Carbamazepine
Sawczyńska et al ⁵	77 yr F	Orofacial dyskinesia and involuntary chorea-type movements of the trunk and all limbs	11	Normal	Elevated serum inflammation markers dyselectrolytemia	Arterial hypertension, diabetes mellitus, hypothyroidism, and urinary incontinence and three malignancies in remission	Marked features of cerebral small vessel disease. Diffuse white matter hyperintensities, cortical and subcortical atrophy	Steroids diazepam remdesivir, IVIG
Cotta Ramusino et al ⁶	62 yr M	Choreiform movements in all four limbs, head, and trunk. Mild encephalopathy (impulsivity, hyperactivity, and attention impairment)	Before	Mildly decreased glucose mildly increased albumin	Normal	Type 2 diabetes mellitus and arterial hypertension	SWI showed hypointense signal in the dorsolateral portion of both putamina	Tetrabenazine, haloperidol
Bymes et al ⁷	36 yr M	Intermittent rapid, irregular, and no purposeful movements of the both upper extremities with mild encephalopathy	Before	Mildly elevated lymphocytes	Decreased lymphocytes, mildly increased ESR, CRP.	Drug abuser	Enchantment lesions affecting the bilateral medial putamen and left cerebellum.	Solu-Medrol, IVIG, methylprednisolone
Ghosh et al ⁸	60 yr M	Right-sided involuntary violent flinging movements in all limbs with semi-purposeful dancing movement involving both right upper and lower limbs.	2	NA	Capillary blood glucose 540, mild neutrophilic leukocytosis, lymphopenia increased ESR CRP, metabolic acidosis, and ketonuria	None	Left striatal hyperintensity on T1-weighted imaging	Insulin

(Continues)

TABLE 1 Continued

Author	Patient	Clinical features	Symptoms onset day*	CSF	Lab tests	History	Brain CT/MRI	Treatment
Revert Barberà et al ¹¹	69 yr F	Mixed aphasia, mild right hemiparesis, and choreic movements in all 4 limbs. Headache, focal neurological deficits, seizures, and diffuse encephalopathy.	Before	NA	Elevated d-dimer levels (3160 µg/L),	Fatty liver, fibromyalgia	Capsuloganglionic and thalamic infarcts bilaterally, with thrombosis of the lateral veins, left lateral sinus, straight sinus, and vein of Galen	
Salari et al ¹²	13 yr M	Large-amplitude choreic movements affecting the right side of his body that affected his gait	7 after vaccination	0 RBC, 0 WBC, protein 51 (g/L), glucose 56 (mg/dL)	Normal	None	Multiple white matter lesions, one of them enhanced with gadolinium	Intravenous methylprednisolone and tetrabenazine
Salari et al ¹²	18 yr M	Choreic movements that mainly affected the left upper limb, shoulder, and the left lower limb.	7 after vaccination	3 RBC, 4 WBC, protein 34 (g/L), glucose 64 (mg/dL)	Normal	None	Few nonspecific white matter lesions	Intravenous methylprednisolone and tetrabenazine
This paper case 1	67 yr F	Random, fast, irregular, and involuntary choreiform movements in her face and all four limbs, with right arm dominance.	180	NA	Normal	None	Damaged bilateral basal ganglia	Tetrabenazine
This paper case 2	62 yr F	Choreiform movements on all limbs, especially on the right side	15	NA	Increased ESR, CRP	None	Normal	Tetrabenazine

*Day of choreiform movement onset since COVID-19 first symptoms; CSF, cerebrospinal fluid; NA, no data available; IVIG, intravenous infusion of immunoglobulins; CT, computed tomography; MRI, magnetic resonance imaging.

Financial Disclosures for the Previous 12 Months: The authors declare that there are no additional disclosures to report. ■

References

1. Lopez-Leon S, Wegman-Ostrosky T, Perelman C, Sepulveda R, Rebolledo PA, Cuapio A, Villapol S. More than 50 long-term effects of COVID-19: A systematic review and meta-analysis. *Sci Rep* 2021;11(1):16144. <https://doi.org/10.1038/s41598-021-95565-8>.
2. Sharifian-Dorche M, Huot P, Osherov M, et al. Neurological complications of coronavirus infection; a comparative review and lessons learned during the COVID-19 pandemic. *J Neurol Sci* 2020;417:117085. <https://doi.org/10.1016/j.jns.2020.117085>.
3. Harapan BN, Yoo HJ. Neurological symptoms, manifestations, and complications associated with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease 19 (COVID-19). *J Neurol* 2021;268(9):3059–3071. <https://doi.org/10.1007/s00415-021-10406-y>.
4. Hassan M, Syed F, Ali L, Rajput HM, Faisal F, Shahzad W, Badshah M. Chorea as a presentation of SARS-CoV-2 encephalitis: A clinical case report. *JMD* 2021;14(3):245–247. <https://doi.org/10.14802/jmd.20098>.
5. Sawczyńska K, Wężyk K, Bosak M, et al. Acute-onset chorea and confusional state in 77-year-old COVID-19 patient: A case report. *Neurol Neurochir Pol* 2022;56(1):106–110. <https://doi.org/10.5603/PJNNS.a2022.0003>.
6. Cotta Ramusino M, Perini G, Corrao G, Farina L, Berzero G, Ceroni M, Costa A. SARS-Cov –2 in a patient with acute chorea: Innocent bystander or unexpected actor? *Mov Disord Clin Pract* 2021;8(6):950–953. <https://doi.org/10.1002/mdc3.13274>.
7. Byrnes S, Bisen M, Syed B, et al. COVID-19 encephalopathy masquerading as substance withdrawal. *J Med Virol* 2020;92(11):2376–2378. <https://doi.org/10.1002/jmv.26065>.
8. Ghosh R, Dubey S, Roy D, Ray A, Pandit A, Ray BK, Benito-León J. Choreo-ballistic movements heralding COVID-19 induced diabetic ketoacidosis. *Diabetes Metab Syndr Clin Res Rev* 2021;15(3):913–917. <https://doi.org/10.1016/j.dsx.2021.04.010>.
9. Yüksel MF, Yıldırım M, Bektaş Ö, Şahin S, Teber S. A sydenham chorea attack associated with COVID-19 infection. *Brain Behav Immun Health* 2021;13:100222. <https://doi.org/10.1016/j.bbih.2021.100222>.
10. Aggarwal A, Adukia S, Bhatt M. Video anthology of movement disorders due to infections in South Asia. *Mov Disord Clin Pract*. 2021;8(6):843–858. <https://doi.org/10.1002/mdc3.13275>.
11. Revert Barberà A, Estraguès Gazquez I, Beltrán Mármol MB, Rodríguez Campello A. Corea bilateral como forma de presentación de trombosis venosa cerebral asociada a COVID-19. *Neurologia* 2021;37:507–509.
12. Salari M, Etemadifar M. Two cousins with acute Hemichorea after BBIBP-CorV (Sinopharm) COVID -19 vaccine. *Mov Disord* 2022;37:1101–1103.