Guillain-Barré syndrome related to SARS-CoV-2 infection

Kévin Bigaut, MD,* Martial Mallaret, MD, PhD,* Seyyid Baloglu, MD, Benjamin Nemoz, MD, Patrice Morand, MD, PhD, Florent Baicry, MD, Alexandre Godon, MD, Paul Voullemiot, MD, Laurent Kremer, MD, PhD, Jean-Baptiste Chanson, MD, PhD, and jérôme de Seze, MD, PhD

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The outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) responsible for coronavirus disease 2019 (COVID-19) led to the death of thousands of people around the world.1 Neurologic manifestations are not much specific apart from acute anosmia, and post-infectious manifestation data are missing.2 We described the cases of 2 patients exhibiting demyelinating form of Guillain-Barré syndrome (GBS) and summarized neurologic manifestations and investigations results in table 1.

A 43-year-old man presented with cough, asthenia, and myalgia in legs, followed by acute anosmia and ageusia with diarrhea the next day. Symptoms resolved spontaneously after 2 weeks. Twenty-one days after the beginning of respiratory symptoms, he presented with a rapidly progressive manner paraesthesia, hypoesthesia, and distal weakness in the lower limbs. In the following 2 days, these symptoms extended to the midthigh and tip of the fingers associated with ataxia, and he was hospitalized at day 4 because a right peripheral facial palsy had occurred. His body temperature was 36.9°C and oxygen saturation was 99%. Neurologic examination disclosed decreased light touch from midthigh to feet and the tip of the fingers; decreased vibration sense in the lower limbs, symmetric weakness for dorsiflexion and extension of the toes (Medical Research Council [MRC] score = 3/5) and flexion of the thigh (MRC = 4/5); and areflexia in the forelimbs apart from the left biceps reflex.

Laboratory results at day 4 were unremarkable (normal blood cell count, negative C-reactive protein, negatives HIV, Lyme, and syphilis serologies). Antgangliosides antibodies were negatives. Nasopharyngeal swab test was positive for SARS-CoV-2 on reverse transcription-polymerase chain reaction (RT-PCR) assay. CT of the chest showed ground-glass opacities in negatives. Nasopharyngeal swab test was positive for SARS-CoV-2 on reverse transcription-protein, negatives HIV, Lyme, and syphilis serologies). Antigangliosides antibodies were negatives. Nasopharyngeal swab test was positive for SARS-CoV-2 on reverse transcription-polymerase chain reaction (RT-PCR) assay. CT of the chest showed ground-glass opacities in negatives. Nasopharyngeal swab test was positive for SARS-CoV-2 on reverse transcription-protein, negatives HIV, Lyme, and syphilis serologies).

An obese 70-year-old woman presented with anosmia and ageusia, followed by diarrhea for 2 days. She complained of mild asthenia and myalgia without fever. All symptoms resolved excepted anosmia and ageusia. Nasopharyngeal swab test was positive for SARS-CoV-2 on RT-PCR assay. Seven days later, she presented with acute proximal tetraparesis and distal forelimb and perioral

*These authors contributed equally to the manuscript.

From the Service de Neurologie (K.B., P.V., L.K., J.-B.C., J.S.), Hôpitaux Universitaires de Strasbourg; Service de Neurologie (M.M.), Centre Hospitalo-Universitaire de Grenoble Alpes, La Tronche; Service de Neurologie (B.N., P.M.), Centre Hospitalo-Universitaire de Grenoble Alpes, La Tronche; Service de Réanimation Polyvalente Chirurgicale (A.G.), Centre Hospitalo-Universitaire de Grenoble Alpes, La Tronche, France.

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showed subnormal cell count (6 × 10^6/L), increased protein mg/L. Antigangliosides antibodies were negative. CSF results at admission, C-reactive protein was slightly increased at 22

cities, di temporal dispersion, upper limb increased motor distal laten-
can be sensitive decreased conduction velocities and conduction blocks.

Days between CSF findings Nerve MRI results Treatments
onset of GBS and GBS and signs and studies and evolution

| Patient | Days between GBS symptoms and signs | CSF findings | Nerve conduction studies | MRI results | Treatments and evolution |
|---------|------------------------------------|--------------|--------------------------|-------------|-------------------------|
| 1. Man 48 yo | 21 d Flaccid paraparesis, generalized areflexia, lower-limb and distal upper-limb paresthesia, ataxia; right facial palsy (day 4) | Day 4: protein level: 0.95 g/L; cell count: 1 × 10^6/L; negative SARS-CoV-2 RT-PCR | Day 9; demyelinating pattern with motor decreased conduction velocities and conduction blocks | Day 7; radiculitis and plexitis on both brachial and lumbar plexus; multiple cranial neuritis (in nerves III, VI, VII, and VIII) | Day 5; IVIg (2 g/kg); progressive improvement |
| 2. Woman 70 yo | 10 d Flaccid tetraparesis, generalized areflexia, forelimb paresthesia; respiratory failure (day 3) | Day 3; protein level: 1.6 g/L; cell count: 6 × 10^6/L; negative SARS-CoV-2 on RT-PCR | Day 7; demyelinating pattern with motor and sensitive decreased conduction velocities and conduction blocks | Not performed | Day 4; IVIg (2 g/kg); slow progressive improvement |

Abbreviations: COVID-19 = coronavirus disease 2019; GBS = Guillain-Barré syndrome; IVIg = IV immunoglobulin infusions; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

Table 1 Clinical characteristics and investigations result for 2 patients with GBS related to SARS-CoV-2 infection

parasthesia. She was hospitalized for dyspnea and loss of ambulation 3 days later and was rapidly transferred to an intensive care unit for noninvasive ventilation for acute respiratory failure with hypercapnia. She was discharged from the intensive care unit 9 days later, without requiring invasive mechanical ventilation. Neurologic examination disclosed proximal lower-limb weakness (MRC 2/5), distal weakness (MRC 4/5), and diffuse areflexia.

At admission, C-reactive protein was slightly increased at 22 mg/L. Antigangliosides antibodies were negative. CSF results showed subnormal cell count (6 × 10^6/L), increased protein level (1.06 g/L), and negative SARS-CoV-2 on RT-PCR assay. CT of the chest showed moderate ground-glass opacities in both lungs (figure e-1, links.lww.com/NXI/A267). Nerve conduction studies at day 7 showed a typical demyelinating pattern with a conduction block in the left median nerve, temporal dispersion, upper limb increased motor distal latencies, diffuse decreased motor and sensory conduction velocities lower than 38 m/s in 9 nerves of 10 tested (table e-1, links.lww.com/NXI/A267), and neurogenic pattern on EMG. IVIg (2 g/kg) were started at day 4 after the onset of the first neurologic symptoms. Left peripheral facial palsy occurred in a delayed manner at day 9. Her clinical condition improved slowly with physiotherapy, needing a transfer in a rehabilitation center. We reported here 2 cases of GBS related to SARS-CoV-2 infection with neurologic improvement on IVIg, adding to few cases of GBS, one case of Miller Fisher syndrome, and one case of polyneuritis cranialis already published.

The first case report described a patient with GBS whose symptoms began 7 days before COVID-19, which asks the question of parainfectious profile or coincidence. However, previous reports and our cases suggest that GBS associated with SARS-CoV-2 infection could start between 5 and 21 days after the SARS-CoV-2 clinical symptoms. It could follow a postinfectious profile as reported on Middle East respiratory syndrome coronavirus infection in 4 patients with Bickstaff’s encephalitis overlapping with GBS.

Thus, our cases add to several other reported cases and strengthen the view that GBS occurs with COVID-19.

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Disclosure
K. Bigaut, M. Mallaret, S. Baloglu, B. Nemoz, P. Morand, F. Baicry, A. Godon, P. Voulleminot, L. Kremer, J.-B. Chanson, and J. de Seze report no disclosures relevant to the manuscript. Go to Neurology.org/NN for full disclosures.

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Appendix

Authors

| Name                  | Location                                                      | Contribution                                                                 |
|-----------------------|---------------------------------------------------------------|------------------------------------------------------------------------------|
| Kévin Bigaut, MD      | Service de Neurologie, Hôpitaux Universitaires de Strasbourg, France | Conception, organization and execution of the research project, and writing of the first draft and the review and critique of the manuscript |
| Martial Mallaret, MD, PhD | Service de Neurologie, Centre Hospitalo-Universitaire de Grenoble Alpes, France | Conception, organization and execution of the research project, and writing of the first draft and the review and critique of the manuscript |
| Seyyid Baloglu, MD    | Service de Neuroradiologie, Hôpitaux Universitaires de Strasbourg, France | Conception, organization and execution of the research project, and writing of the first draft and the review and critique of the manuscript |
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Appendix (continued)

| Name                  | Location                                                                 | Contribution                                                                                           |
|-----------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Benjamin Nemoz, MD    | Institut de Biologie Structurale (IBS), Université de Grenoble Alpes, CEA, CNRS, France | Conception and organization of the research project and review and critique of the manuscript           |
| Patrice Morand, MD, PhD | Institut de Biologie Structurale (IBS), Université de Grenoble Alpes, CEA, CNRS, France | Conception and organization of the research project and review and critique of the manuscript            |
| Florent Baicry, MD    | Service d'Accueil des Urgences, Hôpitaux Universitaires de Strasbourg, France | Conception and organization of the research project and review and critique of the manuscript            |
| Alexandre Godon, MD   | Service de Réanimation Chirurgicale, Centre Hospitalo-Universitaire de Grenoble Alpes, France | Conception and organization of the research project and review and critique of the manuscript            |
| Paul Voulleminot, MD  | Service de Neurologie, Hôpitaux Universitaires de Strasbourg, France       | Conception and organization of the research project and review and critique of the manuscript            |
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In the Article "Guillain-Barré syndrome related to SARS-CoV-2 infection" by K. Bigaut et al.,¹ there are several errors in table 1. The age noted for the patient described in the first case should be 43; additionally, the protein level in CSF should be listed as 0.94 g/L for this patient. Lastly, for the patient described in the second case, the protein level in CSF should be listed as 1.06 g/L. The authors regret the errors.

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1. Bigaut K, Mallaret M, Baloglu S, et al. Guillain-Barré syndrome related to SARS-CoV-2 infection. Neurol Neuroimmunol Neuroinflamm 2020;7:e785. doi:10.1212/NXI.0000000000000785.