








## Guillain-Barré syndrome in the COVID-19 era: just an occasional cluster?

Gian Luigi Gigli<sup>1,2,3</sup>  · Francesco Bax<sup>2</sup> · Alessandro Marini<sup>2</sup>  · Gaia Pellitteri<sup>2</sup>  · Anna Scalise<sup>1</sup>  ·  
Andrea Surcinelli<sup>2</sup> · Mariarosaria Valente<sup>1,2</sup> 

Received: 24 April 2020 / Revised: 11 May 2020 / Accepted: 12 May 2020  
© Springer-Verlag GmbH Germany, part of Springer Nature 2020

Dear Sirs,

In terms of epidemiology, Guillain-Barré syndrome (GBS) accounts for 1–2 new cases/100.000 inhabitants per year [1, 2]. During the last two weeks, in coincidence with the descending slope of the pandemic peak in our region (Friuli Venezia-Giulia, Italy), we noted an unusual cluster of patients affected by GBS. The Neurology of the Udine University Hospital is the only Neurology Unit for the entire territory of the province, making unlikely the possibility of missing new cases, since this is the only facility for neurophysiological investigation and cerebrospinal fluid (CSF) examination in an area of 4,969.3 km<sup>2</sup>. Solicited by this observation and by a recent paper reporting the association of GBS with COVID-19 infection [3], we decided to re-examine the frequency of GBS cases during the March–April months of the last three years and to compare it with the admissions for GBS during the same months of the current year (up to April 16th).

After having the possibility to perform a quick test (Cellex<sup>TM</sup> q rapid test [4]) for the presence of IgM and IgG against SARS-CoV-2 nucleocapsid protein (N-protein), we tested the four patients still present in our ward and two more patients already discharged who accepted to come back to the hospital. Furthermore, we briefly described clinical, laboratory and neuro-physiological data of patients admitted this year in Table 1. Data dealing with COVID-19 are reported in Table 2.

The total number of GBS in the March–April interval of the previous three years is four. In 2020, from March 1st to April 15th, we observed instead seven new cases diagnosed as GBS, in addition to a relapse in one more patient. This means 0.67 cases/month of observation (four cases in six months) in the previous three years, compared to 3.5 cases/month (seven cases in two months) during the current year, which increases to 4 cases/month (eight cases in two months), if we consider also the patient with relapse. Considering a population of 535,516 inhabitants in the province of Udine (2017 census), the monthly incidence in March–April period of previous years was 0.12 new cases/100.000 inhabitants per month (in line with the epidemiological literature [1, 2]) versus 0.65 cases/100.000 inhabitants per month during the ongoing pandemic. Accordingly, compared to years 2017–2019, the increase of GBS cases in 2020 is 5.41-fold.

The suspicion that this striking difference could be due to the pandemic curve in our region is, therefore, legitimate. In fact, it is well known that GBS and related syndromes are often post-infectious (as for the influenza epidemics and more recently for Zika virus [5]), with an usual latency of 10–14 days after infection [2]. However, in our series, only one patient (twice negative at swab test) had positive serology and thorax CT scan. Despite the serologic and swab negativity of the others, we think that the association with the descending slope of SARS-CoV-2 infection should still be evaluated, since the specificity and sensitivity of these tests are not yet completely assessed and the exact slope of the humoral immune response curve to this new virus is still unknown. It could also be possible that asymptomatic or paucisymptomatic infections may not develop an antibody response sufficient enough to be detected, especially considering that the available test is only qualitative.

We wonder if similar clusters have been observed elsewhere.

✉ Alessandro Marini  
alemarini00@gmail.com

<sup>1</sup> Clinical Neurology Unit, Santa Maria della Misericordia University Hospital, Udine, Italy

<sup>2</sup> Department of Medicine (DAME), Neurology Unit, University of Udine, Piazzale Santa Maria della Misericordia 15, 33100 Udine, Italy

<sup>3</sup> DMIF, University of Udine, Udine, Italy

**Table 1** Demographic, clinical, CSF and neurophysiological findings in the observed population with GBS

ID	Age, Sex	Previous infection symptoms	GBS symptoms	Symptoms onset	CSF proteins ( <i>r</i> : 150–450 mg/L)	CSF leucocytes ( <i>r</i> : 0–3/ $\mu$ L)	Neurophysiological studies
1	76, M	No	Tetraparesis Dysarthria Dysautonomia	27/02/2020	228 mg/L	0.6/ $\mu$ L	AMSAN
2	70, M	Diarrhea	Paraparesis Paraesthesia Ataxia	07/02/2020	216 mg/L	0.6/ $\mu$ L	AIDP
3	80, M	No	Arthromyalgia Low back pain Paraesthesia Paraparesis	20/03/2020	933 mg/L	0/ $\mu$ L	AIDP
4	59, M	No	Emifacial paresthesia Facial weakness (VII c.n.) Dysarthria (XII c.n.)	24/03/2020	701 mg/L	2.8/ $\mu$ L	Altered blink reflex, demyelinating damage (MFS)
5	59, F	Fever Cough Common cold	Low back pain Paraesthesia Tetraparesis	01/03/2020	1124 mg/L	0.4/ $\mu$ L	AIDP
6	82, M	Fever	Asymmetric paraparesis	28/03/2020	827 mg/L	0.8/ $\mu$ L	AIDP
7	53, M	Fever Diarrhea	Paraesthesia Ataxia	01/04/2020	1928 mg/L	2.6/ $\mu$ L	AIDP
8	59, F	No	Tetraparesis Paraesthesia	11/02/2020 (relapse)	NA <sup>a</sup> (relapse)	NA (relapse)	AIDP relapse

*ID* patient identification number, *GBS* Guillain-Barré syndrome, *CSF* cerebrospinal fluid, *M* male, *F* female, *AMSAN* acute motor-sensory axonal neuropathy, *AIDP* acute inflammatory demyelinating polyneuropathy, *MFS* Miller-Fisher syndrome, *c.n.* cranial nerve, *r* normal range for laboratory, *NA* not available

<sup>a</sup>During patient's first episode of AIDP, with onset on December 2019, CSF examination showed a protein content of 930 mg/L, with 0.8/ $\mu$ L cells. On the occasion of the clinical relapse, lumbar puncture was not performed

**Table 2** Data dealing with COVID-19 in the population with GBS

ID	COVID-19 common symptoms <sup>a</sup>	Swab test	Thorax imaging suggestive for COVID-19 (Rx or thorax CT scan)	SARS-CoV-2 serology	PCR for SARS-CoV-2 on CSF	Serology or PCR for other infections	Serum anti-gangliosides antibodies
1	No	24/03/2020 negative	Interstitial pneumonia	NA	NA	Negative Multiplex PCR <sup>b</sup> (CSF) Negative serology for <i>Borrelia</i> <sup>c</sup> and TBE (CSF), WNV (serum)	Negative
2	Yes	24/03/2020 negative	No	Negative (blood)	NA	Negative serology for <i>Borrelia</i> and TBE (serum)	Negative
3	No	15/04/2020 negative	No	Negative (blood)	Negative	Negative Multiplex PCR (CSF) Negative serology for <i>Borrelia</i> and TBE (CSF)	NA
4	No	27/03/2020 negative	No	Negative (blood)	Negative	Negative Multiplex PCR (CSF) Negative serology for <i>Borrelia</i> and TBE (serum and CSF)	Negative

Table 2 Continued

ID	COVID-19 common symptoms <sup>a</sup>	Swab test	Thorax imaging suggestive for COVID-19 (Rx or thorax CT scan)	SARS-CoV-2 serology	PCR for SARS-CoV-2 on CSF	Serology or PCR for other infections	Serum anti-gangliosides antibodies
5	Yes	20/03/2020 negative	No	Negative (blood)	NA	Negative Multiplex PCR (CSF)	Negative
6	Yes	07/04/2020 negative	No	Negative (blood)	Negative	NA	NA
7	Yes	06/04/2020 negative 14/04/2020 negative	Bilateral ground-glass opacities	Positive IgM and IgG (blood and CSF)	Negative	Negative PCR for influenza A and B viruses (nasal swab) Negative serology for Borrelia and TBE (CSF)	Negative
8	No	30/03/2020 negative 06/04/2020 negative 15/04/2020 negative	Ground-glass opacities Peri-bronchovascular thickenings	NA	NA	NA	GD1a+ GT1b, anti-sulfatide low titer+

ID patient identification number, CT computed tomography, PCR polymerase chain reaction, CSF cerebrospinal fluid, NA not available, CMV Cytomegalovirus, EBV Epstein-Barr virus, HSV-1 Herpes simplex virus 1, HSV-2 Herpes simplex virus 2, HHV-6 Human herpes virus 6, HPeV Human parechovirus, VZV Varicella-zoster virus, TBE Tick-borne encephalitis, WNV West-Nile virus

<sup>a</sup>We intend symptoms such as fever, cough, cold and diarrhea

<sup>b</sup>Multiplex PCR: EBV, CMV, Enterovirus, HSV-1, HSV-2, HHV-6, HPeV, VZV

<sup>c</sup>Borrelia burgdorferi

**Author contributions** Data access, responsibility, and analysis: AM had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

**Funding** None.

## Compliance with ethical standards

**Conflicts of interest** On behalf of all authors, the corresponding author states that there is no conflict of interest.

**Ethical standard statement** This study followed the tenets of the Declaration of Helsinki and was performed according to the guidelines of the Institutional Review Board of University of Udine Medical School.

## References

- Sejvar JJ, Baughman AL, Wise M, Morgan OW (2011) Population incidence of Guillain-Barré syndrome: a systematic review and meta-analysis. *Neuroepidemiology* 36(2):123–133. <https://doi.org/10.1159/000324710>
- Yuki N, Hartung H-P (2012) Guillain-Barré syndrome. *N Engl J Med* 366(24):2294–2304. <https://doi.org/10.1056/NEJMra11114525>
- Zhao H, Shen D, Zhou H, Liu J, Chen S (2020) Guillain-Barré syndrome associated with SARS-CoV-2 infection: causality or coincidence? *Lancet Neurol*. [https://doi.org/10.1016/S1474-4422\(20\)30109-5](https://doi.org/10.1016/S1474-4422(20)30109-5)
- Cellex qSARS-CoV-2 IgG/IgM Rapid Test (2020) <https://fda.gov/media/136625/download>. Accessed 8 May 2020
- Parra B, Lizarazo J, Jiménez-Arango JA et al (2016) Guillain-Barré syndrome associated with Zika virus infection in Colombia. *N Engl J Med* 375(16):1513–1523. <https://doi.org/10.1056/NEJMoa1605564>