# https://pbs.twimg.com/profile_images/827192633151913984/3v_cKrSF.jpgEvidence Search Service Results of your search request

## CANOMAD syndrome – Covid-19 related peripheral nerve issues

**ID of request:** 26529  
**Date of request:** 3rd December, 2020  
**Date of completion:** 7th December, 2020

If you would like to request any articles or any further help, please contact:  Sarah Rudd at [Sarah.Rudd@nbt.nhs.uk](mailto:Sarah.Rudd@nbt.nhs.uk)

Please acknowledge this work in any resulting paper or presentation as: Evidence search: CANOMAD syndrome – Covid-19 related peripheral nerve issues. Sarah Rudd. ( 7th December, 2020). BRISTOL, UK: North Bristol Library and Information Service.

**Sources searched**  
MEDLINE (60)

**Date range used** (5 years, 10 years): -   
**Limits used** (gender, article/study type, etc.): Adult; English   
**Search terms and notes** (full search strategy for database searches below):

Time spent - 1.5 hours

For more information about the resources please go to: <https://link.nbt.nhs.uk/Interact/Pages/Section/Default.aspx?Section=3527>.

## Summary of Results

There have been 60 articles on this topic published in English in the last year and consequently the search has currently only been conducted in Medline. If you would like this expanded to other databases please let me know.

The majority of articles discuss Covid-19 and either Guillain-Barré and Miller Fisher syndromes, although there are discussion of other types of peripheral neuropathies e.g. diabetic foot. Many of these articles are case studies.

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58. [The suspected SARS-Cov-2 infection in a Charcot-Marie-Tooth patient undergoing postsurgical rehabilitation: the value of telerehabilitation for evaluation and continuing treatment.](#Research799676)
59. [[Guillain-Barré syndrome after covid-19 infection].](#Research799660)
60. [[Guillain-Barré syndrome associated with SARS-CoV-2 infection. Comments after 16 published cases].](#Research799649)

### [B. Search History](#SearchHistory)

## A. Original Research

1. **A Case of Guillain-Barré Syndrome Associated With COVID-19.**  
   Rajdev Kartikeya Journal of investigative medicine high impact case reports 2020;8:2324709620961198.

A novel member of human RNA coronavirus, which is an enveloped betacoronavirus, has been termed severe acute respiratory syndrome coronavirus-2 (SARS COV-2). The illness caused by SARS COV-2 is referred to as the coronavirus disease 2019 (COVID-19). It is a highly contagious disease that has resulted in a global pandemic. The clinical spectrum of COVID-19 ranges from asymptomatic illness to acute respiratory distress syndrome, septic shock, multi-organ dysfunction, and death. The most common symptoms include fever, fatigue, dry cough, dyspnea, and diarrhea. Neurological manifestations have also been reported. However, the data on the association of Guillain-Barré syndrome (GBS) with COVID-19 are scarce. We report a rare case of a COVID-19-positive 36-year-old immunocompromised male who presented with clinical features of GBS. His clinical examination showed generalized weakness and hyporeflexia. The cerebrospinal fluid (CSF) analysis showed albuminocytological dissociation. Intravenous immunoglobulin (IVIG) was administered based on the high clinical suspicion of GBS. The patient's neurological condition worsened with progression to bulbar weakness and ultimately neuromuscular respiratory failure requiring mechanical ventilation. His nerve conduction studies were consistent with demyelinating polyneuropathy. He received five plasma exchange treatments and was successfully weaned from mechanical ventilation. A brain and cervical spine magnetic resonance imaging was obtained to rule out other causes, which was normal. COVID-19 is believed to cause a dysregulated immune system, which likely plays an important role in the neuropathogenesis of GBS.

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1. **A Rare Axonal Variant of Guillain-Barré Syndrome as a Neurological Complication of COVID-19 Infection.**  
   Agha Abbaslou Mojgan Archives of Iranian medicine 2020;23(10):718-721.

Guillain-Barré syndrome (GBS) is a neurological disorder accompanied by several neurological signs and symptoms including progressive weakness and diminished or decreased reflexes. GBS was reported as one of the several neurological complications in MERS-CoV and SARS-CoV outbreaks. Several studies have reported GBS as a neurological complication in recent COVID-19 outbreak. We report on the case of a 55-years -old female who was hospitalized with dyspnea, dry cough, and myalgia. She developed Acute Motor & Sensory Axonal Neuropathy (AMSAN), a rare variant of GBS signs and symptoms including decreased muscle strength and pinprick sensation in both lower extremities during her hospitalization.

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1. **Acute Guillain-Barré polyradiculoneuritis indicative of COVID-19 infection: a case report.**  
   Atakla Hugues Ghislain The Pan African medical journal 2020;35:150.

The new coronavirus 2019 epidemic declared in China on December 31, 2019 soon spread to the rest of the world, becoming the subject of an unprecedented health pandemic according to the World Health Organization's declaration of March 11, 2020. It is a disease that has the potential to cause multiple systemic infections. We report here the case of an acute polyradiculoneuritis of the Guillain-Barré type (GBS) indicative of a COVID-19 infection. This is a 41 year old patient seen for ascending, symmetrical and bilateral, progressive and acute tetraparesis with in a context of influenza syndrome and digestive infections treated 2 weeks earlier. During a COVID-19 infection, certain inflammatory cells stimulated by the virus produce inflammatory cytokines creating immune-mediated processes. The same mechanism is observed in GBS being also an immune-mediated disorder. The management of this disease in COVID-19 positive patients does not differ from that of patients who do not carry the virus. The risk of respiratory distress in COVID-19 positive patients becomes twice as great in patients with GBS who test positive for COVID-19 at the same time. Monitoring for hemodynamic disorders and respiratory distress in a neuro-intensive care unit may be fruitful.

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1. **Acute inflammatory demyelinating polyneuritis in association with an asymptomatic infection by SARS-CoV-2.**  
   Bracaglia Martina Journal of neurology 2020;267(11):3166-3168.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=2466fbf56b23ab386218c8ed0ea749fa)

1. **Acute Motor Axonal Neuropathy Related to COVID-19 Infection: A New Diagnostic Overview.**  
   Petrelli Cristina Journal of clinical neuromuscular disease 2020;22(2):120-121.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=421d02dbf5ffd34c25a90f96dca64123)

1. **Acute polyradiculoneuritis with locked-in syndrome in a patient with Covid-19.**  
   Pfefferkorn Thomas Journal of neurology 2020;267(7):1883-1884.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=49c110d584d62e0427e3848902ccb755)

1. **Anti-pan-neurofascin IgM in COVID-19-related Guillain-Barré syndrome: Evidence for a nodo-paranodopathy.**  
   Tard C.éline Neurophysiologie clinique = Clinical neurophysiology 2020;50(5):397-399.

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1. **COVID 19 infection presenting as motor peripheral neuropathy.**  
   Abdelnour Loay Journal of the Formosan Medical Association = Taiwan yi zhi 2020;119(6):1119-1120.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=8577e551387ea503eebb3d075e820983)

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1. **COVID-19 presenting with ophthalmoparesis from cranial nerve palsy.**  
   Dinkin Marc Neurology 2020;95(5):221-223.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=d6be3e96967efb5fce0bc1e4a9da58f3)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=dc4ef18526108a59105be501aa010179)

1. **COVID-19 reveals influence of physical activity on symptom severity in hereditary spastic paraplegia.**  
   van de Venis Lotte Journal of neurology 2020;267(12):3462-3464.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=1948da44695e14c66d31c0d42d0fb157)

1. **COVID-19-Associated Bifacial Weakness with Paresthesia Subtype of Guillain-Barré Syndrome.**  
   Hutchins K. L AJNR. American journal of neuroradiology 2020;41(9):1707-1711.

We report a case of bifacial weakness with paresthesia, a recognized Guillain-Barré syndrome subtype characterized by rapidly progressive facial weakness and paresthesia without ataxia or other cranial neuropathies, which was temporally associated with antecedent coronavirus 2019 (COVID-19). This case highlights a potentially novel but critically important neurologic association of the COVID-19 disease process. Herein, we detail the clinicoradiologic work-up and diagnosis, clinical course, and multidisciplinary medical management of this patient with COVID-19. This case is illustrative of the increasingly recognized but potentially underreported neurologic manifestations of COVID-19, which must be considered and further investigated in this pandemic disease.

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1. **COVID-19-Associated Miller Fisher Syndrome: MRI Findings.**  
   Lantos J. E AJNR. American journal of neuroradiology 2020;41(7):1184-1186.

Miller Fisher syndrome, also known as Miller Fisher variant of Guillain-Barré syndrome, is an acute peripheral neuropathy that can develop after exposure to various viral, bacterial, and fungal pathogens. It is characterized by a triad of ophthalmoplegia, ataxia, and areflexia. Miller Fisher syndrome has recently been described in the clinical setting of the novel coronavirus disease 2019 (COVID-19) without accompanying imaging. In this case, we report the first presumptive case of COVID-19-associated Miller Fisher syndrome with MR imaging findings.

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1. **Early Guillain-Barré syndrome in coronavirus disease 2019 (COVID-19): a case report from an Italian COVID-hospital.**  
   Ottaviani Donatella Neurological sciences : official journal of the Italian Neurological Society and of the Italian Society of Clinical Neurophysiology 2020;41(6):1351-1354.

Guillain-Barré syndrome (GBS) is an acute polyradiculoneuropathy associated with dysimmune processes, often related to a previous infectious exposure. During Italian severe acute respiratory syndrome coronavirus-2 outbreak, a woman presented with a rapidly progressive flaccid paralysis with unilateral facial neuropathy after a few days of mild respiratory symptoms. Coronavirus was detected by nasopharyngeal swab, but there was no evidence of its presence in her cerebrospinal fluid, which confirmed the typical albumin-cytological dissociation of GBS, along with consistent neurophysiological data. Despite immunoglobulin infusions and intensive supportive care, her clinical picture worsened simultaneously both from the respiratory and neurological point of view, as if reflecting different aspects of the same systemic inflammatory response. Similar early complications have already been observed in patients with para-infectious GBS related to Zika virus, but pathological mechanisms have yet to be established.

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1. **Facial diplegia, a possible atypical variant of Guillain-Barré Syndrome as a rare neurological complication of SARS-CoV-2.**  
   Juliao Caamaño David Salomón Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia 2020;77:230-232.

We present a case of facial diplegia after 10 days of SARS-CoV-2 confirmed infection symptoms in a 61 year old patient without prior clinically relevant background. There are few known cases of Guillain-Barré Syndrome (GBS) related to SARS-CoV-2 infection; we propose this case as a rare variant of GBS in COVID-19 infection context, due to Its chronology, clinical manifestations and cerebrospinal fluid (CSF) findings.

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[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=fd47267c5a7d0cd6290a0768acae5fd3)

1. **Fatal Guillain-Barre syndrome after infection with SARS-CoV-2.**  
   Marta-Enguita J. Neurologia (Barcelona, Spain) 2020;35(4):265-267.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=eb1b1db1b3acbea65e6f6f311468c3dc)

1. **Guillain Barre syndrome associated with COVID-19 infection: A case report.**  
   Sedaghat Zahra Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia 2020;76:233-235.

Novel outbreak with coronavirus 2019 began since 31 December 2019. Coronaviruses can cause multiple systemic infections that respiratory complications are the most obvious symptoms. In this report, we describe the symptoms of Guillain Barre syndrome (GBS) in one infected patient with COVID-19, for the first time. We reported a 65-years- old male patient with complaints of acute progressive symmetric ascending quadriparesis. Two weeks prior to hospitalization, the patient suffered from cough, fever, and RT-PCR was reported positive for COVID-19 infection. The electrodiagnostic test showed that the patient is an AMSAN variant of GBS. COVID-19 stimulates inflammatory cells and produces various inflammatory cytokines and as a result, it creates immune-mediated processes. GBS is an immune-mediated disorder and molecular mimicry as a mechanism of autoimmune disorder plays an important role in creating it. It is unclear whether COVID-19 induces the production of antibodies against specific gangliosides. Further investigations should be conducted about the mechanism of GBS in patients with COVID-19, in the future.

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1. **Guillain-Barré syndrome after COVID-19 in Japan.**  
   Hirayama Takehisa BMJ case reports 2020;13(10):No page numbers.

We report the first case of Guillain-Barré syndrome (GBS) associated with SARS-CoV-2 infection in Japan. A 54-year-old woman developed neurological symptoms after SARS-CoV-2 infection. We tested for various antiganglioside antibodies, that had not been investigated in previous cases. The patient was diagnosed with GBS based on neurological and electrophysiological findings; no antiganglioside antibodies were detected. In previous reports, most patients with SARS-CoV-2-infection-related GBS had lower limb predominant symptoms, and antiganglioside antibody tests were negative. Our findings support the notion that non-immune abnormalities such as hyperinflammation following cytokine storms and microvascular disorders due to vascular endothelial damage may lead to neurological symptoms in patients with SARS-CoV-2 infection. Our case further highlights the need for careful diagnosis in suspected cases of GBS associated with SARS-CoV-2 infection.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=480c4904bee90c647817d3f4bf7ba001)

1. **Guillain-Barré syndrome as a complication of SARS-CoV-2 infection.**  
   Coen Matteo Brain, behavior, and immunity 2020;87:111-112.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=50d5bd6049c4c398ab75985aac5edc16)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=33026029cb1a035a0699c0a8e36ac094)

1. **Guillain-Barré Syndrome as a Neurological Complication of Novel COVID-19 Infection: A Case Report and Review of the Literature.**  
   Paybast Sepideh The neurologist 2020;25(4):101-103.

INTRODUCTIONThe novel coronavirus (COVID-19) is a global pandemic. Although the main clinical manifestation of COVID-19 is respiratory involvement, there is evidence suggesting the neuroinvasive potential of COVID-19. There are limited reports of neurological complications of COVID-19 infection in the literature. Herein, we aim to describe 2 members of a family affected by COVID-19, presenting with ascending paresthesia with the final diagnosis of Guillain-Barré syndrome.CASE REPORTA 38-year-old man presented with a history of ascending paresthesia and bilateral facial droop since 5 days before admission. The medical history was positive for flu-like symptoms affecting all the members of his family. The neurological examination was notable for bilateral peripheral facial paralysis, generalized areflexia, and derceased sensation in distal limbs. The cerebrospinal fluid analysis revealed an albuminocytologic dissociation. In addition, the electromyography-nerve conduction study findings were suggestive of acute axonal-demyelinating polyneuropathy. Meanwhile the patient was treated with a diagnosis of Guillain-Barré syndrome, his 14-year-old daughter presented with a history of progressive paresthesia and weakness. Similar to her father, the paraclinical evaluations were consistent with Guillain-Barré syndrome. Taking into account clinical findings and the outbreak of COVID-19, the suspicion of COVID-19 was proposed. Eventually, on the basis of throat swab samples stand on polymerase chain reaction, the patients were diagnosed with COVID-19.CONCLUSIONOur cases revealed the familial occurrence of Guillain-Barré syndrome after COVID-19 infection. The authors emphasize neurological complications of COVID-19.

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1. **Guillain-Barré syndrome associated with COVID-19 disease.**  
   Korem Sindhuja BMJ case reports 2020;13(9):No page numbers.

Clinical manifestations of COVID-19 are known to be variable with growing evidence of nervous system involvement. In this case report, we describe the symptoms of a patient infected with SARS-CoV-2 whose clinical course was complicated with Guillain-Barré syndrome (GBS). We present a case of a 58-year-old woman who was initially diagnosed with COVID-19 pneumonia due to symptoms of fever and cough. Two weeks later, after the resolution of upper respiratory tract symptoms, she developed symmetric ascending quadriparesis and paresthesias. The diagnosis of GBS was made through cerebrospinal fluid analysis and she was successfully treated with intravenous immunoglobulin administration.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=878ab3fd9d3ca187e9f979ba4a402f29)

1. **Guillain-Barré syndrome associated with COVID-19 infection: a case from the UK.**  
   Tiet May Yung BMJ case reports 2020;13(7):No page numbers.

Originating from Wuhan, China, COVID-19 has rapidly spread worldwide. Neurological manifestations are more commonly associated with severe COVID-19 infection. Guillain-Barré syndrome (GBS) is a rare immune-mediated postinfectious neuropathy. It has been reported as a possible rare complication of COVID-19. We report a case of GBS associated with COVID-19 in the UK.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=0aa1afb417fde3d88afb4983b14c0474)

1. **Guillain-Barré syndrome associated with leptomeningeal enhancement following SARS-CoV-2 infection.**  
   Sancho-Saldaña Agustín Clinical medicine (London, England) 2020;20(4):e93.

INTRODUCTIONPatients with coronavirus disease 2019 (COVID-19) typically present with respiratory symptoms, but little is known about the disease's potential neurological complications.We report a case of Guillain-Barré syndrome (GBS) following a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, in association with leptomeningeal enhancement.CASE PRESENTATIONA 56-year-old woman presented with recent unsteadiness and paraesthesia in both hands. Fifteen days earlier, she complained of fever, dry cough and shortness of breath. Her chest X-ray showed a lobar consolidation and PCR was positive for SARS-CoV-2; she was admitted due to mild COVID-19 pneumonia.In the first 48 hours of hospitalisation, she started to experience lumbar pain and weakness of the proximal lower extremities, progressing to bilateral facial nerve palsy, oropharyngeal weakness and severe proximal tetraparesis with cervical flexion 2/5 on the MRC scale. Full spine magnetic resonance imaging (MRI) showed a brainstem and cervical leptomeningeal enhancement. Analysis of cerebrospinal fluid (CSF) revealed albumin-cytological dissociation. Microbiological studies on CSF, including SARS-CoV-2, were negative. Nerve conduction studies were consistent with demyelinating neuropathy. She was treated with intravenous immunoglobulin, with significant neurological improvement noted over the next 2 weeks.CONCLUSIONLeptomeningeal enhancement is an atypical feature in GBS, but could be a marker of its association with SARS-CoV-2 infection.

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[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=8e59a71c43e3ecead5da2eb659bf2e8c)

1. **Guillain-Barré syndrome associated with SARS-CoV-2 infection.**  
   Velayos Galán A. Neurologia (Barcelona, Spain) 2020;35(4):268-269.

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1. **Guillain-Barré syndrome associated with SARS-CoV-2 infection: causality or coincidence?**  
   Zhao Hua The Lancet. Neurology 2020;19(5):383-384.

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1. **Guillain-Barré Syndrome Associated with SARS-CoV-2.**  
   Toscano Gianpaolo The New England journal of medicine 2020;382(26):2574-2576.

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1. **Guillain-Barré syndrome during SARS-CoV-2 pandemic: A case report and review of recent literature.**  
   Scheidl Erika Journal of the peripheral nervous system : JPNS 2020;25(2):204-207.

Acute demyelinating inflammatory polyneuropathy (AIDP) is the most common type of Guillain-Barré syndrome (GBS) in Europe, following several viral and bacterial infections. Data on AIDP-patients associated with SARS-CoV-2 (coronavirus-2) infection are scarce. We describe the case of a 54-years-old Caucasian female patient with typical clinical and electrophysiological manifestations of AIDP, who was reported positive with PCR for SARS-CoV-2, 3 weeks prior to onset of the neurological symptoms. She did not experience a preceding fever or respiratory symptoms, but a transient loss of smell and taste. At the admission to our neurological department, a progressive proximally pronounced paraparesis, areflexia, and sensory loss with tingling of all extremities were found, which began 10 days before. The modified Erasmus Giullain-Barré Syndrome outcome score (mEGOS) was 3/9 at admission and 1/12 at day 7 of hospitalization. The electrophysiological assessment proved a segmental demyelinating polyneuropathy and cerebrospinal fluid examination showed an albuminocytologic dissociation. The neurological symptoms improved significantly during treatment with immunoglobulins. Our case draws attention to the occurrence of GBS also in patients with COVID-19 (coronavirus disease 2019), who did not experience respiratory or general symptoms. It emphasizes that SARS-CoV-2 induces immunological processes, regardless from the lack of prodromic symptoms. However, it is likely that there is a connection between the severity of the respiratory syndrome and further neurological consequences.

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1. **Guillain-Barré syndrome following COVID-19: a newly emerging post-infectious complication.**  
   Webb Silas BMJ case reports 2020;13(6):No page numbers.

A 57-year-old man presented with a progressive flaccid symmetrical motor and sensory neuropathy following a 1-week history of cough and malaise. He was diagnosed with Guillain-Barré syndrome secondary to COVID-19 and started on intravenous immunoglobulin. He proceeded to have worsening respiratory function and needed intubation and mechanical ventilation. This is the first reported case of this rare neurological complication of COVID-19 in the UK, but it adds to a small but growing body of international evidence to suggest a significant association between these two conditions. Increasing appreciation of this by clinicians will ensure earlier diagnosis, monitoring and treatment of patients presenting with this.

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1. **Guillain-Barré syndrome following COVID-19: new infection, old complication?**  
   Padroni Marina Journal of neurology 2020;267(7):1877-1879.

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1. **Guillain-Barré Syndrome in a Patient With Evidence of Recent SARS-CoV-2 Infection.**  
   Naddaf Elie Mayo Clinic proceedings 2020;95(8):1799-1801.

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1. **Guillain-Barré Syndrome in a Patient With Minimal Symptoms of COVID-19 Infection.**  
   Oguz-Akarsu Emel Muscle & nerve 2020;62(3):E54.

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1. **Guillain-Barré syndrome in SARS-CoV-2 infection: an instant systematic review of the first six months of pandemic.**  
   Uncini Antonino Journal of neurology, neurosurgery, and psychiatry 2020;91(10):1105-1110.

A systematic review from 1 January to 30 June 2020 revealed 42 patients with Guillain-Barré syndrome (GBS) associated with SARS-CoV-2 infection. Single cases and small series were reported from 13 countries, the majority from Europe (79.4%) and especially from Italy (30.9%). SARS-CoV-2 infection was demonstrated by nasopharyngeal swab (85.7%) and serology (14.3%). Median time between COVID-19 and GBS onset in 36 patients was 11.5 days (IQR: 7.7-16). The most common clinical features were: limb weakness (76.2%), hypoareflexia (80.9 %), sensory disturbances (66.7 %) and facial palsy (38.1%). Dysautonomia occurred in 19%, respiratory failure in 33.3% and 40.5% of patients were admitted in intensive care unit. Most patients (71.4%) had the classical clinical presentation but virtually all GBS variants and subtypes were reported. Cerebrospinal fluid (CSF) albumin-cytological dissociation was found in 28/36 (77.8%) and PCR for SARS-CoV-2 was negative in 25/25 patients. Electrodiagnosis was demyelinating in 80.5% and levels 1 and 2 of Brighton criteria of diagnostic certainty, when applicable, were fulfilled in 94.5% patients. Antiganglioside antibodies were positive in only 1/22 patients. Treatments were intravenous immunoglobulin and/or plasma exchange (92.8%) with, at short-time follow-up, definite improvement or recovery in 62.1% of patients. One patient died. In conclusion, the most frequent phenotype of GBS in SARS-CoV-2 infection is the classical sensorimotor demyelinating GBS responding to the usual treatments. The time interval between infectious and neuropathic symptoms, absence of CSF pleocytosis and negative PCR support a postinfectious mechanism. The abundance of reports suggests a pathogenic link between SARS-CoV-2 infection and GBS but a case-control study is greatly needed.

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1. **Guillain-Barré syndrome presenting with COVID-19 infection.**  
   Ameer Nasir BMJ case reports 2020;13(9):No page numbers.

A construction worker in his 30s presented three times in 4 days with progressive upper and then lower limb weakness. On the first two occasions he had no systemic symptoms, but on the third presentation he had fever and cough, starting from day 4 of weakness. Examination identified weakness in all four limbs and areflexia, suggesting a peripheral neuromuscular disorder. Investigations were consistent with Guillain-Barré syndrome and additional COVID-19 (SARS-CoV-2) infection. The patient improved after immunoglobulin treatment. At least four cases of Guillain-Barré syndrome have been reported in the literature with concurrent COVID-19 illness in whom respiratory signs appeared a few days after the onset of neurological signs. With the incubation period for COVID-19 respiratory symptoms believed to be up to 14 days, it is possible that neurological symptoms could develop before respiratory and other symptoms. During the current pandemic, presence of concurrent COVID-19 infection needs to be considered in patients presenting with Guillain-Barré syndrome.

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1. **Guillain-Barré syndrome related to COVID-19 infection.**  
   Alberti Paola Neurology(R) neuroimmunology & neuroinflammation 2020;7(4):No page numbers.

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1. **Guillain-Barré syndrome related to SARS-CoV-2 infection.**  
   Bigaut K.évin Neurology(R) neuroimmunology & neuroinflammation 2020;7(5):No page numbers.

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1. **Guillain-Barré Syndrome with Facial Diplegia Related to SARS-CoV-2 Infection.**  
   Chan Jason L. The Canadian journal of neurological sciences. Le journal canadien des sciences neurologiques 2020;47(6):852-854.

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1. **Guillain-Barré syndrome: The first documented COVID-19-triggered autoimmune neurologic disease: More to come with myositis in the offing.**  
   Dalakas Marinos C. Neurology(R) neuroimmunology & neuroinflammation 2020;7(5):No page numbers.

OBJECTIVETo present the COVID-19-associated GBS, the prototypic viral-triggered autoimmune disease, in the context of other emerging COVID-19-triggered autoimmunities, and discuss potential concerns with ongoing neuroimmunotherapies.METHODSEleven GBS cases in four key COVID-19 hotspots are discussed regarding presenting symptoms, response to therapies and cross-reactivity of COVID spike proteins with nerve glycolipids. Emerging cases of COVID-19-triggered autoimmune necrotizing myositis (NAM) and encephalopathies are also reviewed in the context of viral invasion, autoimmunity and ongoing immunotherapies.RESULTSCollective data indicate that in this pandemic any patient presenting with an acute paralytic disease-like GBS, encephalomyelitis or myositis-even without systemic symptoms, may represent the first manifestation of COVID-19. Anosmia, ageusia, other cranial neuropathies and lymphocytopenia are red flags enhancing early diagnostic suspicion. In Miller-Fisher Syndrome, ganglioside antibodies against GD1b, instead of QG1b, were found; because the COVID-19 spike protein also binds to sialic acid-containing glycoproteins for cell-entry and anti-GD1b antibodies typically cause ataxic neuropathy, cross-reactivity between COVID-19-bearing gangliosides and peripheral nerve glycolipids was addressed. Elevated Creatine Kinase (>10,000) is reported in 10% of COVID-19-infected patients; two such patients presented with painful muscle weakness responding to IVIg indicating that COVID-19-triggered NAM is an overlooked entity. Cases of acute necrotizing brainstem encephalitis, cranial neuropathies with leptomeningeal enhancement, and tumefactive postgadolinium-enhanced demyelinating lesions are now emerging with the need to explore neuroinvasion and autoimmunity. Concerns for modifications-if any-of chronic immunotherapies with steroids, mycophenolate, azathioprine, IVIg, and anti-B-cell agents were addressed; the role of complement in innate immunity to viral responses and anti-complement therapeutics (i.e. eculizumab) were reviewed.CONCLUSIONSEmerging data indicate that COVID-19 can trigger not only GBS but other autoimmune neurological diseases necessitating vigilance for early diagnosis and therapy initiation. Although COVID-19 infection, like most other viruses, can potentially worsen patients with pre-existing autoimmunity, there is no evidence that patients with autoimmune neurological diseases stable on common immunotherapies are facing increased risks of infection.

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1. **Guillain-Barré-Strohl syndrome and COVID-19: Case report and literature review.**  
   Diez-Porras Laura Neuromuscular disorders : NMD 2020;30(10):859-861.

In recent months, the new beta-coronavirus has caused a pandemic with symptoms affecting mainly the respiratory system. It is established that the virus may play a neurotropic role and in recent months several cases of Guillain-Barré-Strohl syndrome (GBS) have been reported in patients infected with COVID-19. We report the case of a 54-year-old patient with acute demyelinating polyneuropathy during infection by SARS-CoV-2 who progressed clinically to require assisted ventilation. After several weeks of specific symptomatic treatment, the patient had a favorable outcome. In conclusion, despite being a rare complication, we think it is important to consider the possibility of diffuse involvement of the peripheral nervous system in patients with COVID-19 to adjust clinical monitoring and treatment in these cases.

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1. **HLA and immunological features of SARS-CoV-2-induced Guillain-Barré syndrome.**  
   Gigli Gian Luigi Neurological sciences : official journal of the Italian Neurological Society and of the Italian Society of Clinical Neurophysiology 2020;41(12):3391-3394.

We report the clinical and immunological features in a case of SARS-CoV-2-induced Guillain-Barré syndrome (Si-GBS), suggesting that (1) Si-GBS can develop even after paucisymptomatic COVID-19 infection; (2) a distinctive cytokine repertoire is associated with this autoimmune complication, with increased CSF concentration of IL-8, and moderately increased serum levels of IL-6, IL-8, and TNF-α; (3) a particular genetic predisposition can be relevant, since the patient carried several HLA alleles known to be associated with GBS, including distinctive class I (HLA-A33) and class II alleles (DRB1\*03:01 and DQB1\*05:01). To the best of our knowledge, this is the first case of GBS in which SARS-CoV-2 antibodies were detected in the CSF, further strengthening the role of the virus as a trigger. In conclusion, our study suggests that SARS-CoV-2 antibodies need to be searched in the serum and CSF in patients with GBS living in endemic areas, even in the absence of a clinically severe COVID-19 infection, and that IL-8 pathway can be relevant in Si-GBS pathogenesis. Further studies are needed to conclude on the relevance of the genetic findings, but it is likely that HLA plays a role in this setting as in other autoimmune neurological syndromes, including those triggered by infections.

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1. **Injury-prone: peripheral nerve injuries associated with prone positioning for COVID-19-related acute respiratory distress syndrome.**  
   Malik George R. British journal of anaesthesia 2020;125(6):e478.

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1. **Lessons from an ICU recovery clinic: two cases of meralgia paresthetica after prone positioning to treat COVID-19-associated ARDS and modification of unit practices.**  
   Bellinghausen Amy L. Critical care (London, England) 2020;24(1):580.

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1. **Management of diabetic persons with foot ulceration during COVID-19 health care emergency: Effectiveness of a new triage pathway.**  
   Meloni Marco Diabetes research and clinical practice 2020;165:108245.

AIMTo define the outcomes of persons with diabetes and foot ulcers (DFUs) managed through a specific triage pathway during the COVID-19 crisis.METHODSPatients who had an active DFU during the COVID-19 emergency were included. All participants were managed using a specific triage system driven both by ulcer'severity and concomitant co-diseases. Subjects with severely complicated DFUs were urgently referred to hospital regardless of the concomitant comorbidities. Subjects with complicated DFUs received outpatient evaluation (within 48-72 h) and were admitted to hospital if required (revascularization, surgical intervention, intravenous antibiotic therapy); after the first outpatient visit or hospitalization, patients were followed according to the number of comorbidities (in the case of 3 or more comorbidities patients were followed up by telemedicine). Patients with uncomplicated DFUs were managed by telemedicine after outpatient evaluation. Healing, major amputation, death and rate of COVID-19 infection were evaluated. The minimum follow-up was 1 month.RESULTSThe study group included 151 patients. The mean age was 69.9 ± 14.2 years, 58.9% were male and 91.4% had type 2 diabetes; 58.7% had severely complicated, 21% complicated and 20.3% uncomplicated DFUs. Among those, 78.8% presented with 3 or more comorbidities. One hundred and six patients had regular clinical follow-ups, while 45 were managed through telemedicine. Forty-one (27.1%) patients healed, 3 (1.9%) had major amputations and 3 (1.9%) died. One patient (0.6%) reported COVID-19 positivity due to infection acquired at home.CONCLUSIONThe triage pathway adopted during the COVID-19 pandemic showed adequate management of DFUs and no cases of hospital virus exposure.

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1. **Miller Fisher syndrome and COVID-19: is there a link?**  
   Ray Amanda BMJ case reports 2020;13(8):No page numbers.

Beyond the typical respiratory symptoms and fever associated with severe acute respiratory syndrome, we may still have much to learn about other manifestations of the novel SARS-CoV-2 infection. A patient presented with Guillain-Barré syndrome in China with a concurrent SARS-CoV-2 infection. The following case report looks at a patient presenting with the rare Miller Fisher syndrome, a variant of Guillain-Barré while also testing positive for COVID-19.

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1. **Miller Fisher syndrome and polyneuritis cranialis in COVID-19.**  
   Gutiérrez-Ortiz Consuelo Neurology 2020;95(5):e601.

OBJECTIVETo report 2 patients infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) who presented acutely with Miller Fisher syndrome and polyneuritis cranialis, respectively.METHODSPatient data were obtained from medical records from the University Hospital "Príncipe de Asturias," Alcalá de Henares, and the University Hospital "12 de Octubre," Madrid, Spain.RESULTSA 50-year-old man presented with anosmia, ageusia, right internuclear ophthalmoparesis, right fascicular oculomotor palsy, ataxia, areflexia, albuminocytologic dissociation, and positive testing for anti-GD1b-immunoglobulin G antibody. Five days previously, he had developed a cough, malaise, headache, low back pain, and fever. A 39-year-old man presented with ageusia, bilateral abducens palsy, areflexia, and albuminocytologic dissociation. Three days previously, he had developed diarrhea, a low-grade fever, and poor general condition. Oropharyngeal swab test for SARS-CoV-2 by qualitative real-time reverse transcriptase PCR assay was positive in both patients and negative in the CSF. The first patient was treated with IV immunoglobulin and the second with acetaminophen. Two weeks later, both patients made a complete neurologic recovery, except for residual anosmia and ageusia in the first case.CONCLUSIONSOur 2 cases highlight the rare occurrence of Miller Fisher syndrome and polyneuritis cranialis during the coronavirus disease 2019 (COVID-19) pandemic. These neurologic manifestations may occur because of an aberrant immune response to COVID-19. The full clinical spectrum of neurologic symptoms in patients with COVID-19 remains to be characterized.

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1. **Miller Fisher syndrome diagnosis and treatment in a patient with SARS-CoV-2.**  
   Manganotti Paolo Journal of neurovirology 2020;26(4):605-606.

This case report describes the clinical characteristics of a 50-year-old woman that developed SARS-CoV-2 pneumonia and was admitted at the COVID-19 dedicated unit where she developed neurological symptoms 10 days after admission. After neurological examination, including a panel of blood cerebrospinal fluid biomarkers, a diagnosis of Miller Fisher syndrome (MFS) was hypothesized and intravenous immunoglobulin therapy (IVIG) was initiated. Fourteen days after the start of IVIG treatment, the patient has been discharged at home with the resolution of respiratory symptoms and only minor hyporeflexia at the lower limbs, without any side effect.

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1. **Miller-Fisher-like syndrome related to SARS-CoV-2 infection (COVID 19).**  
   Fernández-Domínguez Jessica Journal of neurology 2020;267(9):2495-2496.

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1. **Neuralgic amyotrophy following infection with SARS-CoV-2.**  
   Siepmann Timo Muscle & nerve 2020;62(4):E68.

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1. **Neurologic aspects of covid-19: a concise review.**  
   Brouwer Matthijs C. Le infezioni in medicina 2020;28:42-45.

In addition to the conventional respiratory symptoms, patients with COVID-19 can exhibit neurological complications. In this concise review, we aim to report the most frequent neurologic manifestations related to Severe Acute Respiratory Syndrome CoronaVirus 2 (SARS-CoV2) infection. SARS-CoV2 can reach the central nervous system from the bloodstream or olfactory pathway by binding ACE-2 receptor and the spike protein protease TMPRSS2. Headache is reported in more than 10% of affected patients and loss of smell and taste disturbance are reported in a slightly smaller percentage of cases. Acute cerebrovascular events are diagnosed in less than 3% of COVID-19 patients, but those with more severe manifestations have cerebrovascular events in more than 6% of the cases, as reported by two retrospective studies from Italy and China. Moreover, five cases of large-vessel stroke have been described in low-symptomatic COVID-19 patients aging less than 50 years suggesting that SARS-CoV2 can be associated with an increase of the risk of stroke in relatively young people. Peripheral nerve diseases can be observed after an apparently uneventful SARS-CoV2. Based on a literature review, nine patients experienced Guillain-Barrè syndrome (GBS) and 6 of these needed mechanical ventilation. Two more cases have been described with Miller-Fisher syndrome or polyneuritis cranialis, both had rapidly resolving symptoms. In conclusion, nervous system symptoms can be observed during SARS-CoV2 infection of which headache and smell and taste disturbance are the main symptoms reported. Cerebrovascular complications can complicate the course of COVID-19 in apparently low-risk patients. GBS is a life-threatening manifestation of COVID-19.

1. **Neurological Disorders Identified during Treatment of a SARS-CoV-2 Infection.**  
   Wada Shinichi Internal medicine (Tokyo, Japan) 2020;59(17):2187-2189.

A 69-year-old man was admitted to our hospital under diagnosis of pneumonia due to severe acute respiratory syndrome-corona virus 2 (SARS-CoV-2) (Day 0). He underwent endotracheal intubation from Day 3. Although his respiratory condition improved and anesthetic drugs were discontinued, no cough reflex was observed despite intubation having been performed until Day 17. His tendon reflexes were also diminished. We suspected that he had developed Guillain-Barré syndrome (GBS), and administered intravenous immunoglobulin from Day 18. The absence of cough reflex improved and extubation was successfully performed on Day 23. Neurological disorders including GBS should be considered when intubated SARS-CoV-2 patients present with a loss of cough reflex during the treatment period.

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1. **Neuromuscular presentations in patients with COVID-19.**  
   Paliwal Vimal Kumar Neurological sciences : official journal of the Italian Neurological Society and of the Italian Society of Clinical Neurophysiology 2020;41(11):3039-3056.

COVID-19 is caused by the coronavirus SARS-CoV-2 that has an affinity for neural tissue. There are reports of encephalitis, encephalopathy, cranial neuropathy, Guillain-Barrè syndrome, and myositis/rhabdomyolysis in patients with COVID-19. In this review, we focused on the neuromuscular manifestations of SARS-CoV-2 infection. We analyzed all published reports on SARS-CoV-2-related peripheral nerve, neuromuscular junction, muscle, and cranial nerve disorders. Olfactory and gustatory dysfunction is now accepted as an early manifestation of COVID-19 infection. Inflammation, edema, and axonal damage of olfactory bulb have been shown in autopsy of patients who died of COVID-19. Olfactory pathway is suggested as a portal of entry of SARS-CoV-2 in the brain. Similar to involvement of olfactory bulb, isolated oculomotor, trochlear and facial nerve has been described. Increasing reports Guillain-Barrè syndrome secondary to COVID-19 are being published. Unlike typical GBS, most of COVID-19-related GBS were elderly, had concomitant pneumonia or ARDS, more prevalent demyelinating neuropathy, and relatively poor outcome. Myalgia is described among the common symptoms of COVID-19 after fever, cough, and sore throat. Duration of myalgia may be related to the severity of COVID-19 disease. Few patients had muscle weakness and elevated creatine kinase along with elevated levels of acute-phase reactants. All these patients with myositis/rhabdomyolysis had severe respiratory complications related to COVID-19. A handful of patients with myasthenia gravis showed exacerbation of their disease after acquiring COVID-19 disease. Most of these patients recovered with either intravenous immunoglobulins or steroids.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=bf078881d47404138eb64d301260c3ad)

1. **New clinical manifestation of COVID-19 related Guillain-Barrè syndrome highly responsive to intravenous immunoglobulins: two Italian cases.**  
   Assini Andrea Neurological sciences : official journal of the Italian Neurological Society and of the Italian Society of Clinical Neurophysiology 2020;41(7):1657-1658.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=a57b68f9e5ceb21c556015809a5c007f)

1. **Novel Coronavirus (COVID-19)-Associated Guillain-Barré Syndrome: Case Report.**  
   Rana Sandeep Journal of clinical neuromuscular disease 2020;21(4):240-242.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=674aeddef4437e96ff120d3950af261c)

1. **Post SARS-CoV-2 Guillain-Barré syndrome.**  
   Arnaud Souraya Clinical neurophysiology : official journal of the International Federation of Clinical Neurophysiology 2020;131(7):1652-1654.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=dea2eff79cccea3375da64c5485a8293)

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=2813dae4f998123b74819d897dc7ff36)

1. **Post-infectious Guillain-Barré syndrome related to SARS-CoV-2 infection: a case report.**  
   Riva Nilo Journal of neurology 2020;267(9):2492-2494.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=fdf51d50dbc6ac538c39c79f8cc74850)

1. **Relation between COVID-19 and Guillain-Barré syndrome in adults. Systematic review.**  
   Trujillo Gittermann L. M Neurologia (Barcelona, Spain) 2020;35(9):646-654.

INTRODUCTIONNumerous cases have been reported of patients with symptoms of Guillain-Barré syndrome associated with COVID-19, but much information is still lacking on this association and its implications. The objective of this review is to analyse the available evidence on this topic in the adult population.MATERIAL AND METHODSA systematic review was conducted of studies published on scientific databases: PubMed, Cochrane, Science Direct, Medline, and WHO COVID-19 database.RESULTSWe identified 47 studies, which were analysed and completed using the Covidence platform; the final analysis included 24 articles, with a total of 30 patients.CONCLUSIONSWe found a strong association between both conditions; furthermore, the studies analysed highlight differences in the presentation of the disease, with greater severity of symptoms in Guillain-Barre syndrome associated with COVID-19.

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1. **SARS-CoV-2-associated Guillain-Barré syndrome with dysautonomia.**  
   Su Xiaowei W. Muscle & nerve 2020;62(2):E48.

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[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=fac7b62e3b0de80ce1093fa4e578655b)

1. **SARS-CoV-2-Associated Guillain-Barre Syndrome With Good Response to Plasmapheresis.**  
   Granger Andre Journal of clinical neuromuscular disease 2020;22(1):58-59.

1. **Severe rapidly progressive Guillain-Barré syndrome in the setting of acute COVID-19 disease.**  
   Abrams Rory M. C Journal of neurovirology 2020;26(5):797-799.

There is concern that the global burden of coronavirus disease of 2019 (COVID-19) due to severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) infection might yield an increased occurrence of Guillain-Barré syndrome (GBS). It is currently unknown whether concomitant SARS-CoV-2 infection and GBS are pathophysiologically related, what biomarkers are useful for diagnosis, and what is the optimal treatment given the medical comorbidities, complications, and simultaneous infection. We report a patient who developed severe GBS following SARS-CoV-2 infection at the peak of the initial COVID-19 surge (April 2020) in New York City and discuss diagnostic and management issues and complications that may warrant special consideration in similar patients.

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1. **The suspected SARS-Cov-2 infection in a Charcot-Marie-Tooth patient undergoing postsurgical rehabilitation: the value of telerehabilitation for evaluation and continuing treatment.**  
   Prada Valeria International journal of rehabilitation research. Internationale Zeitschrift fur Rehabilitationsforschung. Revue internationale de recherches de readaptation 2020;43(3):285-286.

We report, to the best of our knowledge, the first case of a probable COVID-19 infection in a 28-year-old man with Charcot-Marie-Tooth disease. The diagnosis was established through a remote interaction with the patient after early discharge from outpatient therapy due to upcoming traveling restrictions. The COVID-19 disease appeared mild, without major respiratory problems, and no obvious neuromuscular deterioration was reported or observed. Telerehabilitation provided an opportunity to continue with hand rehabilitation after tendon transfer surgery, perform an ad-hoc online evaluation, and advise the patient how to prevent the spread of infection and cope with restrictions limiting outpatient visits. This experience seems valuable for further development of telerehabilitation in anticipation of future pandemics or adversarial events since it allows reaching out to patients unable to travel and overcomes the need for regular outpatient visits.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=9973b36093ba902fa7b7f516a77e37df)

1. **[Guillain-Barré syndrome after covid-19 infection].**  
   García-Manzanedo Sofía Medicina clinica 2020;155(8):366.

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1. **[Guillain-Barré syndrome associated with SARS-CoV-2 infection. Comments after 16 published cases].**  
   Guijarro-Castro C. Neurologia (Barcelona, Spain) 2020;35(6):412-415.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=b344e18b426742ae15f7d4b47ec3c798)

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