Possible COVID 19 Induced Multiple Sclerosis

Adrian Oppong MD MS, Lia Desposito DO
Lankenau Medical Center, Wynnewood ,PA

Introduction

- Multiple Sclerosis (MS) is the most common immune-mediated inflammatory demyelinating disease of the CNS. This can present commonly as sensory loss in limbs or one side of the face, unilateral visual loss, acute or subacute motor weakness, diplopia often with an internuclear ophthalmoplegia, bowel and bladder incontinence.
- The cause of MS is unknown but, it is widely believed to be triggered by a foreign antigen such as viruses or bacteria that cause autoimmunity via molecular mimicry.
- Currently, there is evidence suggesting certain viruses such as EBV and VZV are risk factors for developing Multiple Sclerosis. However, little evidence shows COVID-19 being a possible trigger.

Case Description

43 year old male Pharmacist with a past medical history of right-sided ulnar neuropathy, HSV-2, recent COVID-19 infection (COVID vaccinated, not boosted) presented June 30, 2022 with progressive weakness and paresthesia. In May 2022, he had COVID pneumonia with high-grade fevers, hypoxia, cough and myalgias. He was treated with Paxlovid (nirmatrelvir/ritonavir). His paresthesia started in bilateral fingertips and toes but progressed up to the thighs and into the abdomen. Band-like sensations were noted in the lower chest/upper abdomen. He reported generalized fatigue, fasciculations, and lower extremity weakness upon ambulation. Review of systems was otherwise negative. Family history was significant for MS in his first cousin.

Neurological examination: Allodynia in the proximal lower extremities and lower abdomen. Decreased vibratory sensation, light touch, and temperature in bilateral lower extremities. No signs of nystagmus, motor weakness, clonus, hyperreflexia, and negative Babinski.

MRI brain: Foci of signal abnormality involving the posterior body and splenium of the corpus callosum, along the undersurface of the corpus callosum and in the upper cervical spinal cord.

MRI Cervical/Thoracic/Lumbar Spine: CT spine showed cervical and thoracic spinal cord T2 hyperintense lesions, suggestive of active demyelination.

Labs: Presence of oligoclonal bands in the CSF that were not present in the patient's corresponding serum sample. Serum EBV VCA IgG and nuclear antigen were positive. CSF and serum studies ruled out autoimmune, infectious, or nutritional causes.

Hospital course: On 7/2/22, Patient reported of bilateral eye pressure with mild light sensitivity. Ophthalmology was consulted and upon funduscopic exam, optic neuritis was excluded.

Treatment: He was treated with 5 days of IV Methylprednisolone but had minimal response. Improvement of symptoms were seen 1 week after discharge. He was discharged with baclofen for lower extremity muscle spasms, gabapentin for neuropathic pain in his fingertips respectively, and follow-up with an MS specialist. In August, he was started on Kesimpta (ofatumumab) weekly injections for 3 weeks and will begin monthly injections on week 5.

Labs and Results

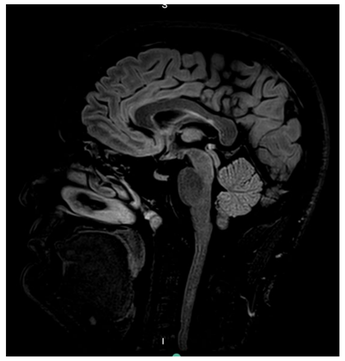

Figure 1. Brain MRI Sagittal T2 Flair w/o contrast. Hyperintense signal noted along the undersurface of the posterior body and splenium of the corpus callosum

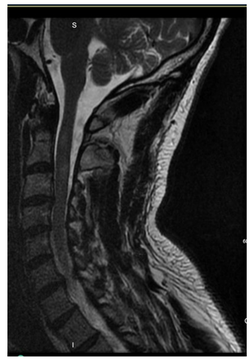

Figure 2. Cervical CT T2 sagittal image. Hyperintense signal noted in spinal cord at C2 and C3 level.

CSF Analysis	
Color	Colorless
Glucose	65
Protein	28
RBC	0
WBC	**31**
Lymph (%)	85
Oligoclonal Bands	**Present**: >5 well defined gamma restriction bands that are not present in the patient's corresponding serum sample.

Infectious	
EBV VCA IgG	**2.68**
EBV VCA IgM	0.27
EBV nuclear antigen	**5.05**
HIV	Nonreactive
Lyme Ab	Negative
West Nile Ab	Negative
SARS-CoV2 PCR	Negative
Influenza A/B	Negative
RSV	Negative
RPR	Nonreactive

Autoimmune/Markers	
ANA	Negative
dsDNA	48
SSA	11
SSB	11
Parietal cell Ab	Negative
Smooth muscle Ab	Negative
Rheumatoid factor	**54**
Intrinsic factor Ab	Negative
Myelin Oligodendrocyte Glycoprotein Ab	Negative
Aquaporin 4 Ab (marker neuromyelitis optica)	Negative
Myelin basic protein	Negative
Angiotensin 1 converting enzyme	26

Endocrine/Nutritional	
TSH	2.06
Vitamin b12	419
Ceruloplasmin	**19**
Copper	75
Folate	**15.3**
CPK	115
A1c	5.3

Discussion

- It is known that certain viruses such as EBV can act as potential triggers for developing multiple sclerosis[5]. Other viruses such as VZV, influenza or adenovirus are associated with more frequent and severe relapses in patients with MS[3].
- COVID-19 has been shown to cause certain neurological manifestations such as anosmia, dysgeusia, and Guillain-Barre Syndrome.
- There have only been a few cases where COVID-19 infection has been linked to the development of CNS demyelinating diseases (only one was confirmed to be MS)[2,7].
- The immune response induced by COVID-19 could lead to activation of lymphocytes which could play a role in the onset of disease. Pathogen may be associated with either triggering or exacerbation of the disease[4].
- Patients infected with COVID-19 who have a history of EBV infection have been shown to test positive for reactivated EBV during the acute phase. Indicating COVID-19's ability to reactivate EBV[1]
- There have been few co-infection cases of COVID-19 and EBV. However, there was no evidence of whether co-infection increased severity or onset of disease[3,5,6].
- This is a unique case of multiple sclerosis that developed approximately 1 month after a severe bout of COVID-19 suggesting that it could be a possible trigger for the disease. The patient also tested positive for EBV nuclear Ag and VCA IgG. However, he did not report of any previous diagnosis of EBV or exhibited symptoms of prior infection.
- Ultimately, the question of whether COVID-19 induced MS or if it contributed to reactivation of EBV, subsequently inducing MS is still up for debate.

Conclusion

MS is an inflammatory disease that results in CNS demyelination. It has been associated with viral triggers such as EBV, VZV, Influenza or Adenovirus. However, only a few cases have shown COVID-19 as a potential trigger for MS

This case not only illustrates COVID-19 as a possible trigger for the development of Multiple Sclerosis but presents a question of whether coinfection with or reactivation of EBV contributed to the development and speed of onset of the disease.

References