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Severe Disability Following COVID

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Abstract

Introduction*: Severe respiratory syndrome coronavirus-2 (SARS CoV-2) has resulted in significant numbers of victims left with critical illness polyneuropathy. Some of them require post-acute rehabilitation until they are reinstated to pre-illness status. But there are some victims who fail to attain noticeable progress towards the road to recovery.*

Objective: *We present here a case of critical illness polyneuropathy (CIP) after COVID-19 infection that failed to recover from neurological manifestation despite more than one and a half year of inpatient intensive multidisciplinary rehabilitation*

Case presentation*: A patient who developed CIP after contracting severe covid-19 infection with multiorgan failure was admitted to our facility for inpatient intensive rehabilitation. After more than a year and a half, there has been fractional to no improvement in his functional status.*

Conclusion*: Patients may not achieve any significant change in the status of their neurological deficit caused by COVID 19. The cost of these acquired disabilities may need to be accounted for in healthcare planning.*

Introduction

Neurological presentations are common following viral infections. These can be minor (anosmia, myalgia, myositis) or major (peripheral neuropathy, Gullian Barre Syndrome, multisystem inflammatory syndrome, dysautonomia etc) (Beghi E, 2020)

Since late 2019, we have been facing severe respiratory syndrome coronavirus-2 (SARS CoV-2), which has caused a huge number of acute disease presentations as well as long lasting symptoms. These are now being popularized as long covid, long-haul covid or the synonymous terms; all of which in most of the instances encompass aforementioned post-viral illness effects with varying degree of involvement or overlap. While most of these symptoms may allay after some time or may become a part of sufferer's tolerance, some post-viral effects may leave the victim with severe debilitating conditions like functional disability. Here, we are presenting a case with the similar post-covid condition that has resulted in victim having severe functional disability that failed to respond to multidisciplinary rehabilitation for more than a year and a half. (Notz, (2021).) The consent of the patient was obtained to report this case, in addition to the approval of the Institute Regional Ethics Committee.

Case presentation

A 66-years-old male with no prior history of diabetes mellitus, hypertension, dyslipidemia, or neurological deficits, presented to the emergency department of a tertiary care hospital after progressively increasing shortness of breath and running high grade fever along with myalgia. Upon further work up, he was diagnosed with severe COVID-19 pneumonia and was admitted for further care in an ICU. A few days later, he progressed to acute respiratory failure and was therefore intubated and connected with mechanical ventilation. He was, later, tracheostomized after failed weaning attempts. His hospital stay was complicated by multiorgan failure (MOF) indicated by respiratory failure and renal shut down, septic shock, and ventilator associated pneumonia (VAP) with Klebsiella pneumoniae bacteremia.

Furthermore, he developed acute kidney injury (AKI) that required continuous renal replacement therapy (CRRT). This was changed to regular hemodialysis via intrajugular (IJ) line, which he was liberated from after a month. During his stay, he had acquired stage 4 to unstageable pressure injuries mainly corresponding to sacral area. One month later, he was transferred to our facility for wound care management and for intensive rehabilitation with a diagnosis of critical illness polyneuropathy (CIP). In our facility he was weaned off the ventilator and was subjected to an intensive inpatient rehabilitation program for his CIP. Nerve conduction studies (NCS) confirmed the CIP. One year later, his neuro-physical status hasn't changed, which means he continued to be bedbound with no purposeful movement and complete dependence for activities of daily living (ADLs).

Motor Nerve conduction study

Nerve (motor)	Site	Lat. (ms)	Duration (ms)	Amp (uV)	Area (mVms)	Seg	Dis (mm)	Int (ms)	NCV (m/s)	CCV	N.D.	Temperature
Median (left)	Wrist	3.9ms	3.0	580.0uV	0.7	Wrist		3.9			-	31.3
Median (left)	Elbow			Absent		Wrist-Elbow					-	
Median(right)	Wrist	3.6	5.7	990	2.8	Wrist		3.6			-	31.3
Median(right)	Elbow	7.9	5.8	790	2.0	Wrist-Elbow	240	4.3.	55.8		-	
Ulnar (left)	Wrist	2.7	5.2	1.4	3.3	Wrist		2.7			-	
Ulnar (left)	Elbow	8.1	4.8	930	2.5	Wrist-Elbow	250	5.5	45.8		-	
Ulnar (left)	Axilla	10.3	5.2	890	2.7	Elbow-Axilla	100	2.1	46.9		-	
Ulnar (right)	Wrist			Absent		Wrist						31.3
Ulnar (right)	Elbow			Absent		Wrist-Elbow						
Ulnar (right)	Axilla			Absent		Elbow-Axilla						
Peroneal (left)	Ankle			Absent		Ankle						31.2
Peroneal (left)	Head of fibula			Absent		Ankle-head of fibula						
Peroneal (left)	popliteal			Absent		Head of fibula-popliteal						
Peroneal (right)	Ankle			Absent		Ankle						31.2
Peroneal (right)	head of fibula			Absent		Ankle-head of fibula						
Peroneal (right)	popliteal			Absent		Head of fibula-popliteal						
Tibial (left)	Ankle			Absent		Ankle						31.3
Tibial (left)	Popliteal			Absent		Ankle-Popliteal						
Tibial (right)	Ankle			Absent		Ankle						31.3
Tibial (right)	Popliteal			Absent		Ankle-Popliteal						

Sensory Nerve Conduction Study

Nerve (Sensor)	Site	Lat. (ms)	Duration (ms)	Amp (uV)	Area (mVms)	Seg	Dis (mm)	Int (ms)	NCV (m/s)	CCV	N.D.	Temperature
Median (left)	Wrist			Absent		Wrist						31.3
Median (right)	Wrist	2.4	3.1	6.1	0.5	Wrist	130	2.4	53.3			31.3
Ulnar (left)	Wrist	2.3	3.0	6.9	0.1	Wrist	110	2.3	48.7			31.3
Ulnar (right)	Wrist			Absent		Wrist						31.3
Radial (left)	Forearm	1.8	2.5	8.8	0.5	Forearm	100	1.8	54.3			31.3
Radial (right)	Forearm			Absent		Forearm						31.3
Sural (left)	Mid-calf			Absent		Mid-calf						31.3
Sural (right)	Mid-calf			Absent		Mid-calf						31.2
S.Peroneal (left)				Absent		Mid branch						31.3
S.Peroneal (right				Absent		Mid branch						31.

Discussion:

Coronavirus Disease 2019 (Covid-19) is an illness caused by severe respiratory syndrome coronavirus-2 (SARS CoV-2) that was first identified as an outbreak in the Wuhan, China. The first case report to WHO happened to be on December 31, 2021, and it was declared pandemic on March 11, 2020 (WHO Website, 2020). Since its emergence, it has undergone many genetic transformations manifested by varying degrees of pathogenicity, transmissibility, and disease manifestation. COVID-19 has largely been identified to cause mild to moderate disease to multiorgan failure; from respiratory failure requiring mechanical ventilation to acute kidney injury with dialysis dependance to severe disability manifested by severe neurological deficits one of which is critical illness neuropathy (WHO, n.d.) The burden caused by Covid-19 infection is not limited to acute health care providing facilities for managing acute presentations of the disease but extends its wings to those rehabilitation centers that deal with the repercussions it leaves on the recipients. Following the spread of infection, in addition to acute care hospitals, rehabilitation centers have seen a major influx of cases, which is out of proportion to usual presentations. Putting in other words, a proportion of those suffering from severe disease are left with severe neurological manifestation such a critical illness neuropathy requiring intensive rehabilitation program in facilities that are normally designed to withstand the burden of post-acute presentations like stroke, trauma victims, post-neurosurgical complications. On the top of that, the length of stay would vary from one sufferer to another. (Cabañes-Martínez L) (Moghimi N, 2021 Jun 28.) Keeping that in consideration, there will be some, as represented by our case, with no benefit despite protracted course of intensive rehabilitation. Hence, resulting in prolonged occupancy of the resources, over burdening of already loaded system and possible unavailability of the resources for a potentially recoverable sufferer with severe disease. On the other hand, it will leave a proportion of people left alone with symptoms, which may add a miserable aspect to the life of sufferers.

Recently, a new term has been introduced which became popular with different synonyms few of which are long covid, persistence of covid, post-acute sequela of covid etc. (Raveendran, 2021) These terms largely define a wide array of post-covid presentations with a wide range of symptoms/conditions lasting beyond 12 weeks of initial negative COVID-19 RT-PCR, but no agreeable set of symptoms could be made. Rather the addition to the list of countable entities is increasing with increasing extent of disease and rising number of victims. Some theories have been tossed up in an attempt to describe the possible pathophysiological phenomena like antibody mediated immunological reaction, persistence of viral particles and vasculitis. (SJ., 2021) In addition to that, some presentation can be explained by persistence/progression of organ damage caused by the systemic illness like pulmonary fibrosis, kidney disease etc. While these phenomena, to some extent, explain the etiological basis of variety of presentations, it doesn't provide sole basis for each of the presentations. (Garg M, 2021 Jun 14.) (Beghi E, COVID-19 Infection and Neurological Complications: Present Findings and Future Predictions., 2020)

Furthermore, while long COVID (or synonymous terms) entity gave an umbrella term to embrace an increasing set of post covid presentations. Some of these presentations are more ominous/severe than those commonly encountered and one such condition is being faced by the case we presented; who recovered from the organ dysfunction but continued to have CIP that proved to be refractory to multidisciplinary rehabilitation. While our case (victim) fails to recover from the CIP, we wonder if it is really a case of extreme critical illness neuropathy that failed to respond to conventional intensive multidisciplinary rehabilitation for a protracted period (more than a year and a half) or it is chronic subsidiary of direct viral effect that has resulted in disability.

In the case presented here, the victim with severe rehabilitation-refractory neurological disability heralds a section of unreported victims of similar type who either couldn't stay in the hospital to be reported, couldn't get a chance to get a space at a rehabilitative facility, or went unnoticed due to lack of healthcare resources. It is important to highlight the presence of such patients because of the severity of the complication and the burden on the healthcare system it may cause in coming days.

Conclusion

The pandemic is still progressing all over the world. The number of victims is growing too. Some patients may have severe physical disability and the healthcare and the social service systems may need to be prepared for the consequences. Additionally, the healthcare practices may need to be prepared to follow up COVID victims with severe complications related to immobility such as contractures, pressure ulcers, infections, and mood disorders. Last but not the least, we may need to be prepared to manage the growing disability that could be hiding under the carpet of post-covid sequela.

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