

### PERIPHERAL NEUROPATHY ASSOCIATED WITH SARS-CoV-2 INFECTION

Bălănuță Tatiana <sup>1,2</sup>, Groppa Stanislav <sup>1,2</sup>

<sup>1</sup> Nicolae Testemitanu State University of Medicine and Pharmacy, Department of neurology no.2, Chisinau, Republic of Moldova

<sup>2</sup> Institute of Emergency Medicine, Clinical Department of Neurology, Epileptology and Internal Disease, Chisinau, Republic of Moldova

#### Introduction.

Coronavirus disease 2019 (COVID-19) is a contagious disease caused by SARS-CoV-2. Symptoms of COVID-19 include fever, cough, headache, fatigue, breathing difficulties, and loss of smell or taste. Neurological complications have been reported in the context of COVID-19 infection both in the acute and subacute phase, as part of the post-COVID syndrome. To the best of current knowledge, observational investigations reported peripheral nervous system involvement in up to 8.9 % of people. <sup>1</sup>

**Keywords:** Peripheral polyneuropathy, SARS-CoV-2, EMG, NCS.

**Material and methods.** Anamnesis, clinical and paraclinical data were taken from medical records in Institute of Emergency Medicine. Patients were investigated by RT-PCR, lung radiography, brain and lung computed tomography (CT), electrophysiological examen. The literature on similar cases has been studied. The exclusion criteria were: diabetes; presence of premorbid neuropathy or premorbid symptoms compatible with diagnosis of neuropathy; alcohol abuse; cancer; family history of genetic neuropathy; CPK values beyond the normal range.

**Purpose.** Description of 9 patients with peripheral polyneuropathy, as a secondary neurological complication associated with SARS-CoV-2.

**Results.** Peripheral nerve conduction examination was performed using a Synergy on Nicolet®EDX, by Natus Neurology. All patients had a standard battery of nerve conduction motor and sensory studies, including median, ulnar, peroneal, sural and tibial nerves on both sides, using both recording and stimulating surface electrode. Following electrical stimuli of the different nerves, motor nerve conduction was examined by recording the compound muscle action potential (CMAP) from surface electrodes overlying the muscle supplied by each motor nerve.

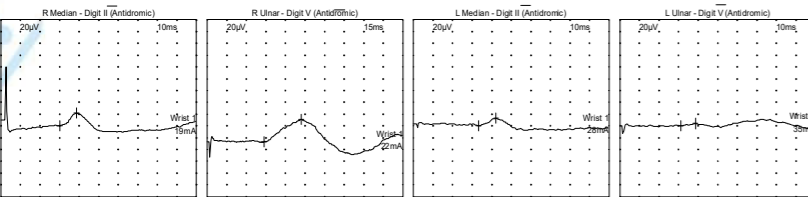


Fig. 1. Table 1. Sensory nerve conduction studies

Nerve / Sites	Rec. Site	Onset Lat ms	Peak Lat ms	NP Amp µV	PP Amp µV	Segments	Distance mm	Velocity m/s
<b>R Median - Digit II (Antidromic)</b>								
Wrist	Dig II	3,02	3,85	21,7	31,8	Wrist - Dig II	130	43
<b>L Median - Digit II (Antidromic)</b>								
Wrist	Dig II	3,33	4,22	13,0	20,8	Wrist - Dig II	130	39
<b>R Ulnar - Digit V (Antidromic)</b>								
Wrist	Dig V	4,38	7,19	37,7	53,2	Wrist - Dig V	110	25
<b>L Ulnar - Digit V (Antidromic)</b>								
Wrist	Dig V	3,13	3,85	4,0	6,7	Wrist - Dig V	110	35

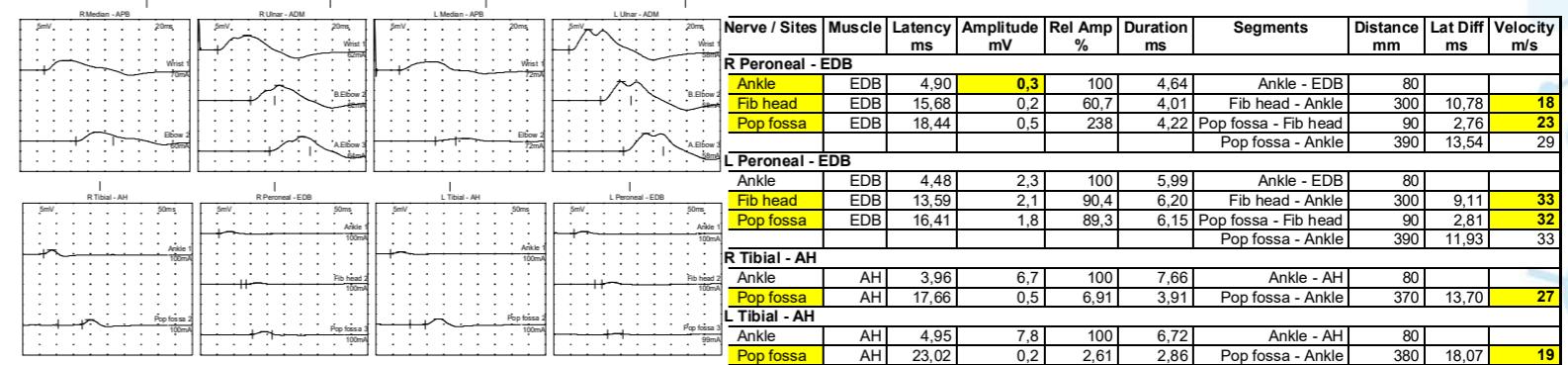


Fig. 2 Motor nerve conduction studies

Nerve / Sites	Muscle	Latency ms	Amplitude mV	Rel Amp %	Duration ms	Segments	Distance mm	Lat Diff ms	Velocity m/s
<b>R Peroneal - EDB</b>									
Ankle	EDB	4,90	0,3	100	4,64	Ankle - EDB	80		
Fib head	EDB	15,68	0,2	60,7	4,01	Fib head - Ankle	300	10,78	18
Pop fossa	EDB	18,44	0,5	238	4,22	Pop fossa - Fib head	90	2,76	23
						Pop fossa - Ankle	390	13,54	29
<b>L Peroneal - EDB</b>									
Ankle	EDB	4,48	2,3	100	5,99	Ankle - EDB	80		
Fib head	EDB	13,59	2,1	90,4	6,20	Fib head - Ankle	300	9,11	33
Pop fossa	EDB	16,41	1,8	89,3	6,15	Pop fossa - Fib head	90	2,81	32
						Pop fossa - Ankle	390	11,93	33
<b>R Tibial - AH</b>									
Ankle	AH	3,96	6,7	100	7,66	Ankle - AH	80		
Pop fossa	AH	17,66	0,5	6,91	3,91	Pop fossa - Ankle	370	13,70	27
<b>L Tibial - AH</b>									
Ankle	AH	4,95	7,8	100	6,72	Ankle - AH	80		
Pop fossa	AH	23,02	0,2	2,61	2,86	Pop fossa - Ankle	380	18,07	19

Table 2. Motor nerve conduction studies



Interstitial pneumonia with 60% pulmonary involvement at admission

**Results.** The patients presented at different intervals after suffering the infection, evidenced by 2 negative nasopharyngeal tests with 48 hours between them and discharged from the hospital with progressive muscle weakness in the limbs, especially the involvement of the proximal muscles mainly in the lower limbs with areflexia.

Electrophysiological examination were performed which confirmed the diagnosis of demyelinating polyneuropathy in 3 patients, axonal multiple mononeuropathy in 5 patients and axonal mononeuropathy in 1 patients, meeting the electrophysiological criteria <sup>2</sup>. 5 patients received corticosteroids with marked improvement in two of them, and minimal improvement in the other three patients. The other 4 patients did not receive specific treatment.

#### Conclusions:

- This case series describes a variety of unique presentations of peripheral neuropathies after mild-severe COVID-19 infection.
- Neurological manifestations appear to be more frequent in patients who have developed severe disease and in the elderly.
- Peripheral neuropathies in patients with COVID-19 are frequent result from immune mechanisms and neurotoxic side effects of

drugs applied to treat COVID-19 and, from the compression of peripheral nerves after prolonged bedding on the ICU, but we must not exclude the neurotropism of the SARS-CoV2 virus. <sup>3</sup>

- Management of peripheral nerve injury in COVID-19 survivors should be included in future COVID-19-specific rehabilitation programs in order to prevent long-term sequelae.

<sup>1</sup> Fernandez CE, Franz CK, Ko JH, Walter JM, Koralnik II, Ahlawat S, Deshmukh S. Imaging Review of Peripheral Nerve Injuries in Patients with COVID-19. Radiology. 2021 Mar;298(3):E117- E130.

<sup>2</sup> Ellul MA, Benjamin L, Singh B, Lant S, Michael BD, Easton A, Kneen R, Defres S, Sejvar J, Solomon T. Neurological associations of COVID-19. Lancet Neurol. 2020 Sep;19(9):767-783. doi: 10.1016/S1474-4422(20)30221-0. Epub 2020 Jul 2. PMID: 32622375; PMCID: PMC7332267.

<sup>3</sup> Panagiotis Zis. Peripheral neuropathy in the COVID-19 era. Signa Vitae. 2021. 17(S1):44-44.

Neurotrophic, neuroinvasive, and neuroinflammatory features of SARS-CoV2

Compression of peripheral nerves resulting from prolonged bedding in the Intensive Care Unit (ICU)

Peripheral neuropathy in patients with COVID-19

Pre-existing risk factors

Immune mechanisms or neurotoxic side effects of drugs used to treat the symptoms of COVID-19