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CASE REPORT

Post-polio syndrome induced by Long Covid?

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Abstract

Introduction: A disease known as post-polio syndrome (PPS) develops 30 to 40 years after an individual has been acutely infected with the paralytic and non-paralytic poliovirus. The most recognizable symptoms are the gradual development of muscle atrophy and wasting accompanied by joint and muscle discomfort. Long covid is a syndrome of persistent symptoms of COVID-19 and is challenging to diagnose, but it is believed to appear three to twelve weeks after infection. Notably, there still needs to be a confirmed correlation between COVID-19 and PPS, hence the importance of this report. *Case report:* CRC, 58 years old, female, history of Acute Anterior Poliomyelitis at age 4. The disease affected all four limbs, with several surgical interventions on the spine, in addition to 3 tendon transpositions. In 2021, after acute infection with Sars-Cov-2, she began a clinical condition marked by alopecia, dyspnea on medium exertion, and new paresis in the upper and lower limbs and trunk. She had initially been diagnosed with Long Covid, but after a neurological examination, she found signs and symptoms consistent with Post-Polio Syndrome. *Conclusion:* This case report highlights the complex need for understanding and further studies of the possible relationship between

PPS and Long Covid. In addition, patients need rehabilitation to regain independence after diagnosis of PPS after Sars-Cov 2 infection.

Keywords: postpoliomyelitis syndrome, neurologic manifestations, SARS-CoV-2.

Resumo

Síndrome pós-pólio induzida por Covid longa?

Introdução: A síndrome pós-pólio (SPP) desenvolve-se geralmente décadas após o episódio agudo de poliomielite anterior. Os sintomas mais reconhecíveis são o desenvolvimento gradual de amiotrofia e danos musculares, acompanhados de lesões articulares. Covid longa é caracterizada como uma síndrome, com sintomas persistentes de COVID-19. Acredita-se que emerge após 3 semanas da primoinfecção. Ressaltamos que deve haver uma correlação confirmada entre COVID-19 e SPP - fato que justifica a importância da apresentação do caso. *Relato de caso:* CRC, 58 anos, sexo feminino, antecedentes de Poliomielite Anterior Aguda aos 4 anos. A doença afetou as quatro extremidades, com várias intervenções cirúrgicas na coluna vertebral, além de 3 transposições tendinosas. Em 2021, padeceu por infecção aguda por Sars-Cov-2, iniciando quadro clínico por alopecia, dispneia e paresia nos membros e tronco. Inicialmente, o diagnóstico clínico fora somente de Covid longa, mas, após minucioso exame neurológico e exames complementares, sinais e sintomas compatíveis com o Síndrome Pós-Pólio faziam-se presentes. *Conclusão:* O artigo de caso destaca a necessidade de compreender e realizar mais estudos sobre a possível relação entre PPS e Covid longa. Além disso, os pacientes necessitam de reabilitação física direcionada, visando otimizar a independência funcional depois do diagnóstico de SPP após infecção de Sars-Cov-2.

Palavras-chave: síndrome pós-poliomielite; manifestações neurológicas; SARS-CoV-2.

Resumen

Síndrome post-polio causada por COVID largo?

Introducción: Una enfermedad conocida como síndrome post-polio (PPS) se desarrolla de 30 a 40 años después de que un individuo ha sido infectado de forma aguda anteriormente. Los síntomas más reconocibles son el desarrollo gradual de atrofia y desgaste muscular acompañado de molestias en las articulaciones y los músculos. El covid largo es un síndrome de síntomas persistentes de COVID-19 y es difícil de diagnosticar, pero se cree que aparece de tres a doce semanas después de la infección. En particular, aún debe haber una correlación confirmada entre COVID-19 y PPS, de ahí la importancia de este informe. *Reporte de caso:* CRC, 58 años, sexo femenino, antecedentes de Poliomieltis Anterior Aguda a los 4 años. La enfermedad afectó a las

cuatro extremidades, con varias intervenciones quirúrgicas en la columna, además de 3 transposiciones tendinosas. En 2021, tras infección aguda por Sars-Cov-2, inició cuadro clínico caracterizado por alopecia, disnea de medianos esfuerzos y nuevas paresias en miembros superiores e inferiores y tronco. Inicialmente le habían diagnosticado Covid largo, pero después de un examen neurológico, se encontró signos y síntomas compatibles con el Síndrome Post-Polio. *Conclusión:* Este informe de caso destaca la compleja necesidad de comprender y realizar más estudios sobre la posible relación entre PPS y Covid largo. Además, los pacientes necesitan rehabilitación para recuperar la independencia después del diagnóstico de PPS después de la infección por Sars-Cov-2.

Palabras-clave: síndrome pospoliomielitis; manifestaciones neurológicas; SARS-CoV-2.

Introduction

Acute Anterior Poliomyelitis (AAP) is a disease of viral etiology (caused by three types of poliovirus - I, II, and III - of the enterovirus genus). In summary, it destroys the lower motor neurons of the spinal cord, brain, and brainstem, through viral invasion (sensory neurons are spared) [1,2]. As a result, it ends up causing a flaccid and asymmetrical paralysis of the muscles of the spine and lower limbs [1,3,4], which can be partial or total.

An illness known as post-polio syndrome (PPS) develops 30 to 40 years after an individual has been acutely infected with the paralytic and non-paralytic poliomyelitis virus [2,5]. The most recognizable symptoms are gradually developing muscular atrophy and weakening accompanied by joint and muscle discomfort [6]. These symptoms may appear in both clinically afflicted and unaffected muscles during a primary polio infection. After polio (PPMA), progressive muscle atrophy is used when just the limb muscles are weak. Muscle weakness typically develops gradually over many years [3,7].

After a COVID-19 infection, persistent symptoms are called "Long COVID." Long COVID is challenging to diagnose, but it is thought to appear three to twelve weeks after infection [8,9].

It is worth noting that there is still no confirmed correlation between COVID-19 and PPS. Therefore, the importance of this report already finds resonance in other reports in the literature. Many central and peripheral nervous system manifestations associated with coronavirus disease-19 (COVID-19) infection have been reported in the literature in recent years. In addition to neurological manifestations, we may still have much to learn about this new virus's neuropathological mechanism of infection [10].

Case report

CRC, 58 years old, woman, businesswoman. History of Acute Anterior Poliomyelitis at age 4. At the time, she remained hospitalized with severe respiratory impairment, with the use of “lungs of steel.” The disease compromised the four limbs, with several surgical interventions in the spine, in addition to 3 tendon transpositions (Figures 1, 2, and 3). In 2021, after acute Sars-Cov-2 (asymptomatic) infection, she started a clinical picture marked by alopecia, dyspnea on medium exertion, and new paresis in the upper and lower upper limbs and trunk. She had initially received a diagnosis of Long Covid, but after a neurological examination, she found signs and symptoms compatible with Post-Poliomyelitis Syndrome. Currently, her clinical condition remains stable, and she is taking an antidepressant (desvenlafaxine 100 mg/day). Electroneuromyographic examination showed chronic preganglionic motor impairment (anterior tip) of myotomes usually supplied by C5-T1 and L2-S1 roots. Signs of acute denervation were observed in muscles of the shoulder girdle and upper limbs. Respiratory Function Test: moderate restrictive ventilatory disorder. Standard Lab. Cardiac Function: Normal. After an acute and long viral infection, we believe that Sars-Cov-2 may have compromised already weakened neurons in the anterior tip of the spinal cord, triggering PPS.



Figure 1 - *Tendon transposition in the anterior tibial of the right lower limb*



Figure 2 - *Genu recurvatum of the knee joint with right pelvic girdle elevation*



Figure 3 - *Internal hip rotation with inverted tibiotalar joint and plantar flexion. Compensatory tibial peroneal rotation*

Discussion

Numerous ideas are looking at the origins of PPS. One of the theories has a pathophysiology that is similar to shingles. It is thought to be a reactivation of the dormant virus that prevents reinnervation and causes motor neurons to continue degenerating. Not every person with polio experiences viral reactivation [1,4].

Other hypotheses include an autoimmune disorder affecting the motor neurons brought on by prior poliomyelitis. The presence of elevated protein and oligoclonal bands in the CSF of some PPS patients serves as evidence for this [7,11].

So far, the literature needs to bring more evidence to support such theories. However, both can be highlighted as possibilities for a pathophysiological explanation of the case suggested in this article. Of these, the most significant emphasis is on the first hypothesis mentioned above.

Long-term tissue damage brought on by COVID-19 infection may be related to neurological symptoms in COVID patients. Through the olfactory bulb, the SARS-CoV-2 virus can affect the central nervous system, causing neuroinflammation that damages the neuron and, because neurons rarely regenerate, long-lasting neuronal dysfunction that could cause neurological symptoms in long-term COVID [9]. This neuronal damage may be related to the onset of PPS. There was no definite evidence to support the direct neuro pathogenicity of SARS-CoV-2 [12].

One of the first methods to reduce PPS symptoms were active motor rehabilitation through gradual muscle strengthening. Thus, some muscle mechanisms polio survivors adapt during rehabilitation programs [13,14].

Several rehabilitation strategies are possible for PPS, aiming to readjust the affected individual's lifestyle and activities. It is also worth mentioning that pulmonary rehabilitation, with and without physical/aerobic component, can improve pulmonary, physical, and psychosocial functions in patients with COVID-19 or Long Covid and patients with PPS, in view of the respiratory impairment in both diseases at their levels of involvement [14].

However, overuse or overtraining should be avoided, given the muscle injury that may occur and the pathophysiological sequelae of the diseases in question, as they affect musculoskeletal structures, glycogen depletion, fatigue, oxidative stress, cytokine storm, and others [15].

Conclusion

This case report highlights the complex need for understanding and further studies of the possible relationship between PPS and Long Covid, especially in the pathophysiological mechanisms for neuropathies that may be related to the coronavirus. In addition, patients need rehabilitation to regain independence after diagnosing of PPS after Sars-Cov 2 infection.

Conflict of interest

No conflict of interest associated with the article

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Author's contributions

All authors contributed equally during the writing of the work. Whether in the search for references, review of the clinical case and discussion.

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