

Post-COVID-19 Acute Transverse Myelitis: a clinical case report

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Abstract

Coronavirus disease-19 (COVID-19) has been extensively studied for its pathophysiology, therapeutic approaches and complications. This case report mentions post-infectious neurological involvement related to SARS-CoV-2 in a young male patient. After a flu-like syndrome and RT-PCR of naso and oropharyngeal swab confirmed for the pandemic virus, the patient evolves with sensory and motor losses in the lower limbs linked to compromised sphincter control. The diagnosis of transverse myelitis in this present study seeks to discuss the association of this complication with the cause of one of the greatest challenges of the 21st century.

Keywords: COVID-19; SARS-COV-2; Myelitis; Neurological; Complications.

Introduction

Coronavirus disease-19 (COVID-19) was declared a pandemic by the World Health Organization in March 2020. Initially described as a pure respiratory infection, COVID-19 is now considered a multisystem condition. In this context, neurological manifestations and complications of the disease are widely and increasingly recognized [1,2]. Indeed, the neurotropism of SARS-CoV-2 is well demonstrated [2] and

central nervous system involvement has also been reported in past epidemics of other coronaviruses such as SARS-CoV-1 and MERS-CoV [1].

Among the neurological complications of COVID-19 is acute transverse myelitis (ATM), a rare condition whose incidence in adults is estimated at 1.34 to 4.6 cases per million annually [2]. Although the pathogenesis of ATM in the context of COVID-19 remains unknown, some mechanisms have already been proposed, such as the

state of inflammatory changes [3] and viral neurotropism [4].

In the present study, we present a case report of a young male who developed acute transverse myelitis after symptomatic and confirmed SARS-CoV-2 infection. Next, we discuss the main aspects present in the literature regarding this neurological manifestation of COVID-19.

Case Report

A 19-year-old male patient with subacute bilateral progressive and ascending lower limb paresis accompanied by paresthesia, urinary and fecal retention. He was not vaccinated against COVID-19. The physical examination at admission showed the patient was not walking and he had paresis of the lower limbs (strength grade 3/5) associated with areas of hypoesthesia. In upper limbs, strength and sensitivity were preserved. Initial laboratory tests showed an increase in ESR and C-reactive protein, with values of 30mm and 1.17mg/dL respectively. The patient was admitted on the same day.

Spinal magnetic resonance imaging showed dilatation/hypersignal on T2/Short Tau Inversion Recovery (STIR) of the central canal of the spinal cord from C6-D1 and sparse along the dorsal spinal cord, more expressive at levels D3, D4, D6, D7; hypersignal on T2/STIR in the central channel of the D12-L1 medulla; intense uptake by the contrast of the spinal cord at the level of D9-L1; slight enhancement of cauda

equina roots (Figure 1). The diagnostic hypothesis raised was extensive longitudinal myelitis associated with syringomyelia. Cerebrospinal fluid (CSF) analysis was normal.

The patient underwent treatment with methylprednisolone succinate 250mg, intravenously, every 12 hours, in addition to clinical support for the other symptoms. The patient evolved with sensory and motor improvement in about two weeks. At discharge, the neurological examination showed strength grade 4/5 in the right lower limb and grade 5/5 in the left lower limb, with preserved and symmetrical deep reflexes (++/4+), in addition to bilateral Achilles clonus, more evident on the right foot.

Despite the progressive enhancement in strength, he still could not walk. The sensitivity examination showed partial recovery of tactile sensitivity in the lower limbs. Urinary and fecal retention persisted. He is currently under outpatient follow-up.

Discussion and Conclusion

The incidence of acute transverse myelitis in the context of COVID-19 is not yet well established. Although initial articles on the neurological complications of SARS-CoV-2 infection did not include cases of ATM, more recently 43 reported cases of ATM associated with COVID-19 were found in a review [2]. The authors, then, estimated an incidence of 0.5 per million.



Figure 1. STIR/T2 magnetic resonance done by the end of January 2021 showing hyperintensity on spinal cord (white arrows).

Furthermore, a study in a hospital in Italy, with 1760 patients, concluded that ATM related to COVID-19 represents 1.2% of all neurological complications of this disease [5]. Other authors, in a systematic review about spinal cord complications in the context of SARS-CoV-2 infection, concluded that 8 in 21 patients (38.1%) included in the study had acute parainfectious myelitis and 3 (14.3 %), acute post-infectious myelitis [6].

In the same study, the most common neurological symptoms reported by ATM were weakness (66.7%), sensory deficit (66.7%), autonomic dysfunction (3.1%) (including sphincter dysfunction) and

ataxia (4.8 %) [6]. In our case report, weakness, sensory deficit and sphincter dysfunction were also present.

Regarding the time interval between the confirmation of infection by RT-PCR and the emergence of signs and symptoms, an article showed that, in 10 patients reported with spinal cord involvement, this interval ranged from 2 to 12 days, with a mean of 7 days [7]. However, one of the aforementioned studies found that the majority (68%) of reported cases of ATM in the context of COVID-19 had a long latency period (10 days - 6 weeks) for the onset of symptoms [2].

This article contemplates the patient presented in our case report,

who showed about 20 days between the first symptom associated with SARS-Cov-2 infection and the first neurological manifestation of ATM. A short latency period may reflect the direct effect of SARS-CoV-2 neurotropism, while longer latency periods may indicate a post-infectious neurological complication resulting from the host's response to the virus [2].

A study found our literature review reported that most patients included in their systematic review had elevated CSF protein concentration and pleocytosis in CSF [6]. Of 14 patients who received more than one lumbar puncture in a systematic review, one of them was diagnosed with transverse myelitis and had an increase in white blood cells above the expected upper limit, with a predominance of lymphocytes, in the CSF [8].

In one of the aforementioned case reports, the CSF was pleocytic, also with a predominance of lymphocytes, in addition to a slight increase in CSF proteins [7]. In the systematic review of this same writing, 6 out of 10 patients with ATM associated with COVID-19 reported a high value of protein in the CSF, while 4 out of 10 showed pleocytosis. The analysis of the CSF of the patient in our case, despite not finding changes in relation to the reference values, ruled out other possible diagnoses.

In a systematic review by Ladopoulos et al. [1], the following MRI findings of the spine/spinal cord in patients with ATM in the context of

COVID-19 were related: isolated or multifocal hyperintense lesions on STIR or T2 in the cervical and thoracic cord. Some lesions were accompanied by edema, evidencing enlargement of the spinal cord caliber. Such changes do not differ from the ATM non-COVID standard [1].

The most remarkable magnetic resonance finding in the article by Moreno-Escobar et al., which included 10 patients, was hyperintensity in 2 to 3 consecutive spinal segments [7], consistent with data from Ladopoulos et al. It can be said that the information obtained by spinal MRI of the patient in our report - with dilation and hyperintensity of C6-D1 and sparse regions of the thoracic cord - is consistent with the published data.

It was found that steroids were used in most patients as treatment for ATM, in addition to IV immunoglobulin in some others [2]. Another article points out that the treatment used for spinal cord complications, in general, of COVID-19 were corticosteroids (86%) - IV methylprednisolone, IV dexamethasone and oral prednisolone - IV immunoglobulin (24%) and plasmapheresis (38%) [6]. In the case of this report, methylprednisolone was used, with partial response. The authors described that about one third of patients were discharged to a rehabilitation center, due to only partial response to treatment [6]. The patient in our case resorted to physical therapy to restore his motor functions.

There is also a report of a patient who developed longitudinally extensive transverse myelitis after being vaccinated against COVID-19 [9]. The patient, a 31 year-old previously healthy woman, had received the first dose of COVID-19-Vaccine (AZD1222, Astra-Zeneca) 3 weeks prior to symptom onset, and presented to the emergency department with lower limbs paraparesis and paresthesia. She underwent spine MRI with contrast, which revealed signal hyperintensity of the spinal cord from T10 to L1. Authors report that, by the time the study was published, there were 9 transverse myelitis cases associated with COVID-19 vaccination, including Pfizer-BioNTech, Moderna, and Johnson & Johnson's vaccines.

As it was described, post-COVID-19 acute transverse myelitis is a rare late complication of the disease and has clinical manifestations like others ATM etiologies. There are also reports of its association with COVID-19 vaccines. MRI and CSF are the two main tools to confirm the diagnosis and the recommended treatment is based on corticosteroids and immunoglobulin. However, the treatment response rate is only partial in most cases. Further studies are needed to determine the prognostic factors for recovery and to study the optimal treatment, as well as its duration.

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