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Case Report

Inactivated SARS–CoV–2 Vaccine Inducing Acute Transverse Myelitis and Hypercoagulable State: A Case Report

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Abstract

Global pandemic of Coronavirus disease 2019 (COVID-19) have been developed with a respiratory infection as main symptom and vaccines had been proven against SARS-CoV-2 infection. We would like to present acute transverse myelitis with hypercoagulable condition case, after receiving the inactive SARS-CoV-2 vaccine (SinoVac). Case Presentation: This is a case from a 20-year-old male with acute onset of flaccid paraplegia, hyporeflexia, loss of sensation below 5th thoracic level, loss of autonomic function, and a positive Babinski sign bilaterally on 7 days after receiving SARS-CoV-2 vaccine. From lumbar puncture examination, we found elevated liquor cerebrospinal protein with mononuclear cell predominantly and elevated d-dimer and also decreased fibrinogen levels from laboratory examination. From Magnetic Resonance Imaging (MRI) showed hyperintensity at the 5th until 9th thoracal level. He improved motoric strength of the lower limb (walking without assistance), numbness and pain, urine and fecal retention after receiving methylprednisolone for 3 days. Conclusion: Acute transverse myelitis with hypercoagulable state was a rare case associated with COVID-19 vaccination, but clinician should be aware for early detection and giving proper treatment.

Keywords: Acute transverse myelitis, hypercoagulable state, inactivated SARS-CoV-2 vaccine

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Introduction

COVID-19 infection is a rare neurological condition that results in ATM, which causes immune-mediated processes and dysfunction in motor, sensory, or autonomic functions. The frequency of COVID-19 vaccine-associated ATM cases is even less.[1,2] The incidence and severity of COVID-19 infection have been reduced by vaccination in approximately 100 cases post-vaccination.[3] We report a case of acute transverse myelitis with disseminated intravascular coagulation, along with acute flaccid paraplegia, autonomic dysfunction, and pain after receiving SARS-Cov-2 vaccine. Case details have been obtained by the patient with written informed consent. All accompanying pictures are published and the institution has granted this authorization.

Case

Following the administration of inactivated SARS-CoV-2 vaccine, a 20–year-old male was admitted to the neurology department with acute onset of weakness and numbness of both lower limbs, along with girdle-like pain at the lower-thoracic level 7 days later. Two days later he was completely paralyzed in his lower-limbs, losing sensation below the fifth toracal level and having urine and fecal retention. On examination, he was an overweight man with only 31 lbs and normal speech and hearing abilities, as well as having no abnormalities in his cranial nerves. A positive Babinski sign and bilateral hypotonia, hyporeflexia, and paraplegia were observed in the patient. With the loss of pricking pain, temperature sensation, and vibration (tested with

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a tuning fork), the feeling of light touch decreased below the fifth toracal level.

Severe Acute Respiratory Syndrome-Coronavirus-2 (SARS-CoV-2) polymerase chain reaction (PCR) results were negative in a nasopharyngeal swab, revealing an elevated serum D-dimer and low fibrinogen level (94.2 mg/dL) with normal values. WBCs present at 10.010/L and RBC 4.18 106/L. Hemoglobin levels in L, 15.9 g/dL and platelet levels are 313.000/l, 60% is eosinophilic, 30% is neutrophil, and 70% is hemoglobine. 0.70. 45%, relative monocytes 2–10%), eosinophils. (2–6%), and basophils (0–1%). All electrolytes were normal. Both the liver and kidneys were normal. An ultrasound examination revealed an increase in protein concentration (69.5 gr) and a rise in mononuclear cells (57, PMN 19.3% : M. neinc). The toracal spine supporting transverse myelitis was analyzed using a sagittal T2-weighted MRI scan, which revealed hyperintensity at the 5th to 9th level (Figure 1). The diagnosis of acute pain was confirmed by alumnus, laboratory test, and MRI scan. All in all, our findings were definitive. A patient with transverse myelitis has hypercoagulable state. The treatment for his neuropathic pain symptoms was provided by taking methylprednisolone 500mg every 12 hours over 5 days, mecobalamin 500 mg every 8 hours, and gabapentin 100mc twice daily.

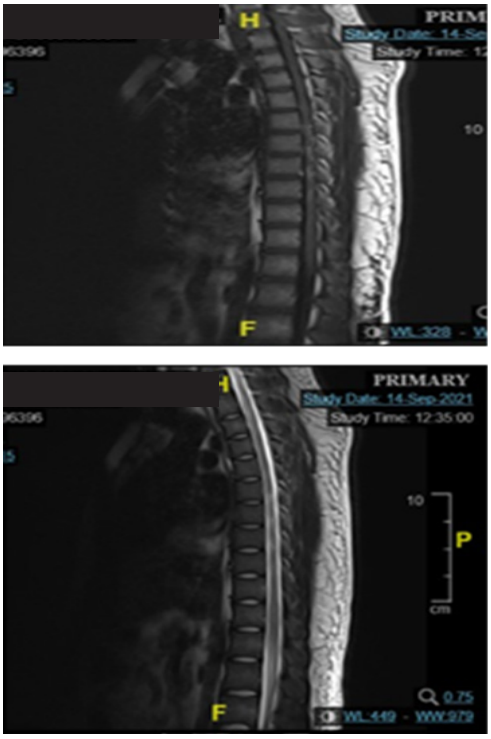

Figure 1. Magnetic Resonance Imaging. There was hyperintensity at the 5th until 9th (arrow) thoracal level suggestion a demyelinating lesion supporting transverse myelitis.

Discussion

Vaccination has led to demyelination of the central nervous system, including influenza, human papilloma virus, hepatitis A or B, measles, rubella, yellow fever, anthrax, meningococcus, and tetanus.[1] Guillain barre syndrome (GBS), acute transverse myelitis (ATM), and acute demyelinating encephalomyelitis (ADEM), neuromyelitis optica (NMOSD), isolated ophthalmoplegia, brachial neuritis and other mononeuropathies were neurological disorders associated with post vaccine administrationPost-vaccination reactions have declined with the use of recombinant proteins, rather than in vivo infected animal tissue. Post vaccination reaction resulting ATM associate with immunopathogenesis disorder of interleukin 6 (IL-6) and interleukin-17 (IL-17).[1,2] Elevated IL-6 and IL-17 can be found both in cerebrospinal fluid (CSF) and peripheral blood as mononuclear cell that can predict severity and disability of ATM. Cytokines such as Tumor necrosis factors-α (TNF-α), interleukin-6 (IL-6), and IL-1 can inhibit the intrinsic anticoagulation pathways and contribute in hypercoagulable state inducing disseminated intravascular coagulation.[4] A microorganism epitope that is produced after vaccination will suggest an immune response with neurological disorders like ATM, which proposed a mechanism for "molecular mimicry." The interaction between the epitope and self-antigen triggers antibodies like B cells and T cells[7-9], which in turn activate immune responses that target the neuron in the spinal cord.[1,4,5,13] The pleocytosis observed in patients' CSF may be the reason for this, as it disrupts the blood-brain barrier in the spine cord region.[4,13] Disseminated intravascular coagulation can result from neurogenic inflammation involving the blood vessel wall (endothelium) and elevated

blood volume, which can cause hypercoagulable conditions.[19] Adenovirus antigens in COVID-19 vaccines may result from immune dysregulation, leading to ATM and hypercoagulation.[1,4-6] Central and peripheral melanocortin receptors are activated by Methylprednisolon, an anti-inflammatory and immunomodulator compound found in the human body.[19]

This case report presented a typical acute transverse myelitis with hypercoagulable state after receiving inactivated SARS-CoV-2 vaccine (SinoVac) on acute onset, complete neurological problem at 5th thoracal level, elevated protein with predominantly mononuclear cell from CSF results, and demyelinating lesion at 5th thoracal spine confirmed by MRI thoracal image. However, we still need further investigation to explain pathogenesis and causal relationship between the SARS-CoV-2 vaccine and ATM.[3-6] Further research and clinical trials for consideration about efficacy and safety of SARS-CoV-2 vaccine especially in heterologous vaccine that using adenoviral agents to prevent neurological complication compared with homolog vaccination.[10,11,14-18] Based on the cases above, clinicians should be aware of post-vaccination autoimmune reactions because immunological interaction reactions can sometimes not be predicted well. So that early detection of post-vaccination autoimmune reactions can be taken immediately for better outcomes.

Limitation of Study

This article had several limitations. I did not platelet-activation assay in this patient.

Conclusion

Acute transverse myelitis (ATM) is a rare neurological complication associated with COVID-19 infection that cause spinal cord neural injury, resulting in motor, sensory, and autonomic dysfunction because of immune-mediated processes. There was a cross-reaction between the epitope and self-antigen activates antibodies such as B lymphocyte and T cells, which induces the immune responses targeting in spinal cord's neuron and hypercoagulation state. However, immunologic reaction after vaccination was difficult to be known well before, so addressing a prompt diagnosis and proper treatment to decrease the acute transverse myelitis morbidity.

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