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Case Report

Acute Transverse Myelitis in a Child with Down Syndrome After Pfizer-BioNTecH COVID-19 Vaccine Second Dose

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Abstract

Many pediatric and adult cases of acute transverse myelitis secondary to COVID-19 infection have been reported in the literature so far, but vaccine-related acute transverse myelitis is very rare. In fact, there have been no reported cases in children until now. Vaccination in children is vital both in the prevention of disease and continuing their social life and education. Hence, we believe that it is essential to follow up and report all of the complications that may occur after vaccination.

Keywords: COVID-19, Down syndrome, transverse myelitis, vaccine

INTRODUCTION

Acute transverse myelitis (ATM) is an inflammatory disease of the spinal cord characterized by rapid onset of motor weakness, sensory alterations, and bladder and bowel dysfunction. Rapid diagnosis and treatment are required.[1] Acute transverse myelitis occurs with parainfectious conditions, demyelinating diseases, spinal cord ischemia, or idiopathic causes. In children, ATM usually occurs after infectious causes, and post-vaccine cases have been reported rarely. Especially in the last 2 years, many ATM cases secondary to severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) (COVID-19) have been reported in both adults and children during the COVID-19 pandemic. Vaccine-related ATM cases are very rare, even in adults, and no cases have been reported in children so far. The neurological side effects of the post-COVID-19 vaccine are mostly dizziness, headache, pain, muscle spasms, myalgia, and paresthesia, and less frequently are tremor, dysphonia, diplopia, tinnitus, seizures, and the reaction of herpes zoster. Guillain–Barre syndrome (GBS), acute disseminated encephalomyelitis, and ATM have been reported much less frequently in databases.[2]

In this article, a case of ATM, which occurred 15 days after Pfizer-BioNTech COVID-19 vaccine in a pediatric patient with Down syndrome, after immune response has appeared, was reported. We suppose that it is crucial to report all of the complications of the vaccine due to its approval and widespread use in children. In particular, as we learn more about the disease, both disease-related and vaccine-related problems will decrease.

CASE PRESENTATION

A 17-year-old boy with Down syndrome was admitted to the pediatric emergency service with sudden onset of back and leg pain, inability to walk, and inability to urine and defecate in the last 24 hours. There was no history of fever, infection, cough, or trauma. The SARS-CoV-2 reverse transcriptase polymerase chain reaction test (rtPCR) from the throat swab was reported to be negative. The Pfizer-BioNTech COVID-19 vaccine had been applied 15 days ago. Medical and family histories were unremarkable. He was conscious, oriented, and cooperative, and his cranial nerves were intact. Deep tendon reflexes were asymmetric positive at the first admission, then were symmetric brisk. Abdominal reflex was positive, muscle strength was 5/5 in the upper extremity, 4/5 in the lower extremity proximal, 2/5 at the left foot, 3/5 at the right foot, the bladder is distended, and globe was positive, and there was no stool sensation (Figure 1). The laboratory examination values were, White blood cell (WBC) 7200 (10^9/L), Hb 16 (g/dL), thrombocyte 190 000 (10^9/L). There was no problem with peripheral blood biochemical parameters (Aspartat aminotransferase (AST), Alanine aminotransferase (ALT), urea, creatinine, glucose, uric acid, calcium, and magnesium). Serology for *Borrelia burgdorferi*,

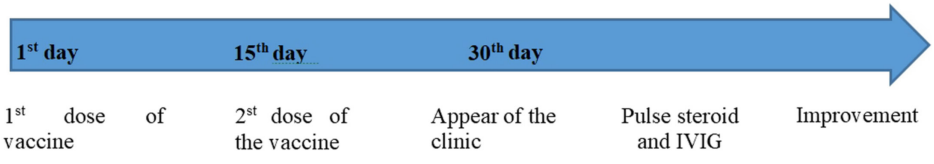

Figure 1. Clinical progression of the patient.

Table 1. Laboratory Parameters

Parameter	Result	Reference Value
WBC (10^9/L)	7200	3.84–9.84
Hgb (g/dL)	16	11–14.5
Platelet (10^9/L)	190 000	175 000-332 000
Glucose CSF (mg/dL)	71	40-70
Protein CSF (mg/dL)	42	150-450
Cell CSF (/µL)	-	-
Oligoclonal band CSF	-	-
IgG index CSF		
Glucose serum (mg/dL)	117	60-100
ESR (mm)	14	0-15
CRP (mg/dL)	15	0-5
Vitamin B12 (pg/mL)	106	
ANA	Positive	-
Anti-dsDNA (IU/mL)	Negative	-
C3	0.9	0.79-1.52
C4	0.3	0.16-0.38
Anti-phospholipid ab	0.7	<10
Anti-SSA (AI)	Negative	-
Anti-SSB (AI)	Negative	-
Aquaporin 4 antibody	Negative	-
MOG ab	Negative	-
EBV VCA IgM	0.15	0–0.49
CMV IgM	0.21	0–0.84
Borrelia IgM	1.8	<20

ANA, antinuclear antibody; CRP, C-reactive protein; CSF, cerebrospinal fluid; EBV, Epstein-Barr virus; ESR, Erythrocyte sedimentation rate; SSA, anti–Sjögren's-syndrome-related antigen A; SSB, anti–Sjögren's-syndrome-related antigen B.

cytomegalovirus (CMV), rubella, toxoplasma, Epstein-Barr virus, Herpes simplex virus type 1 and type 2 (HSV-1 and -2) was negative, and also antinuclear antibodies, anti-double-stranded DNA, phospholipid antibodies, cardiolipin antibodies was negative. Vitamin B12 106 (pg/mL) supportive treatment was started. Cerebrospinal fluid analysis was normal for protein, glucose levels, and IgG index; no cells or oligoclonal bands were observed. Serum anti-Myelin oligodendrocyte glycoprotein (MOG) ab, anti-aquaporin 4 (AQP4) ab, and IgG index were all negative (Table 1). Electromyelography (EMG) was normal. Contrast-enhanced brain magnetic resonance imaging (MRI) was normal, and there was a signal increase in the cord central extending from L1 and L2 levels to the conus medullaris in spinal MRI (Figure 2). It was evaluated as ATM with the history, clinical, and MRI findings. Methylprednisolone 30 mg/kg/day for 5 days by 20 mg/kg for 2 days, and Intravenous human immunglobulin (IVIG) 2 g/kg over 5 days were applied, followed by prednisolone 2 mg/kg p.o. His muscle strength, ability to gaita, and urination gradually improved. The symptoms appeared on 15th day after the second dose of the vaccine. At first admission, COVID-19 IgG was 28.6 (positive). Since the patient did not have a history of recent infection or trauma, it was primarily considered as a secondary immune reaction to the vaccine.

MAIN POINTS

- While Infection related Covid-19 diseases are very common, vaccine-related diseases are reported rarely.
- All of the children should be followed up after vaccination.
- Complications should be reported.

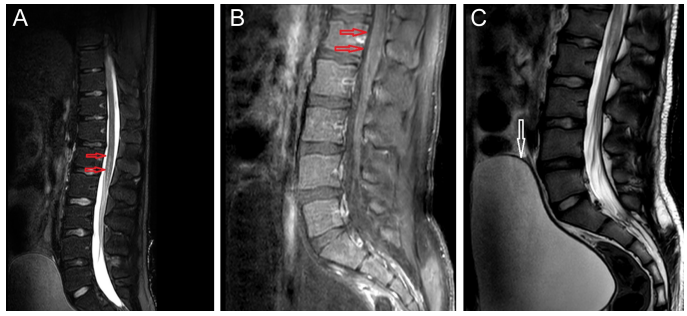

Figure 2. Brain and spinal magnetic resonance imaging (MRI) of the patient. (A) Sagittal view of the lumbar spine post-contrast enhancement. T1 shows no contrast enhancement (red arrows). (B) Short T1 inversion recovery (STIR) sagittal view of the lumbar spine shows hyperintensity suggesting demyelination or transverse myelitis in the lower cord and conus medullaris (red arrows). (C) Sagittal T2-weighted lumbar MRI, the bladder is distended (white arrow, globe).

DISCUSSION

In this article, the first pediatric ATM case that occurred after 15 days after the second dose of Pfizer-BioNTech COVID-19 vaccine, which is an mRNA COVID-19 vaccine, has been reported. Many pediatric and adult cases of ATM secondary to COVID-19 infection have been reported in the literature so far, but vaccine-related ATM is very rare. In fact, there have been no reported cases in children until now. COVID-19-associated ATM may result from abnormal direct or indirect immune pathways, including angiotensin-converting enzyme-2-related pathway, trans-synaptic pathway, hematogenous and lymphatic pathways, or migration of infected immune cells.[3] The COVID-19 pandemic, which was first encountered in 2019, still causes enormous social and economic problems, as well as morbidity and mortality, despite some precautions (such as masks and isolation) taken all over the world.[4,5] It causes morbidity and mortality especially in children even if it does not as much as in adults, apart from educational and social problems. Therefore, it has become crucial for children vaccinated promptly.[6] During the vaccination period, similar to other vaccines (influenza vaccine, hepatitis vaccine, dipht heria-pertussis-tetanus vaccine, polio vaccine), some immune-related problems may be encountered.[7] However, we consider that it is substantial to report complications, especially in children during this common vaccination period. Adult cases of ATM associated with post-vaccination have been reported, so the Pfizer-BioNTech vaccine may be related to a possible disimmunity due to Down syndrome. Albokhari et al[8] reported an ATM case following Pfizer-BioNTech vaccine. Guarnaccia et al[9] reported a case of ATM as the first multiple sclerosis event. At the time of our patient's hospital application, that is 15 days after the second dose of vaccine, the COVID IgG test was positive; this was accepted as an indicator of the immune response to the vaccine. In addition, the absence of any problems in vasculitis parameters, immune parameters, and infectious parameters strongly suggests that there is a secondary immune response to the vaccine in the etiology. We assume that this will be clarified in detail in the following years. However, we believe that the safety, efficacy, immunogenic effects, and dose adjustment of the vaccines used in children should be made according to the clinical and genetic characteristics of the patient. Consequently, vaccination in children is vital both in the prevention of disease and continuing social life and education. Hence, we believe that it is essential to follow up and report all of the complications that may occur after vaccination.

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Declaration of Interests: The authors have no conflicts of interest to declare.

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