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Case Report

Acute inflammatory transverse myelitis post-Pfizer-BioNTech-COVID-19 vaccine in 16-year-old

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ABSTRACT

Coronavirus disease 2019 (COVID-19) originated in China in early March 2019. Saudi Food and Drug Authority approved the registration of the Pfizer-BioNTech COVID-19 vaccine in Saudi Arabia on December 10, 2020, and on May 10, 2021, Pfizer-BioNTech was given an authorized emergency use in 12–15-years-old children. Saudi Arabia's Ministry of Health started Pfizer-BioNTech COVID-19 vaccination for 12–18-years-old on June 27, 2021. Here, we have a case of a 16-year-old female admitted to the medical ward diagnosed with acute inflammatory transverse myelitis after 2 weeks from second dose of the Pfizer-BioNTech COVID-19 vaccine. The diagnosis was based on normal laboratory workup but significant radiological findings. She was discharged after a full recovery. There are multiple cases of post-vaccine acute inflammatory transverse myelitis shared by medical journals, but due to lack of literature review for the teenager population, we think our case may be the first case of acute inflammatory transverse myelitis following second dose of Pfizer-BioNTech COVID-19 vaccine in this population.

Keywords: Transverse myelitis, Pfizer, Saudi Arabia, Teenager, Complication

INTRODUCTION

Coronavirus disease 2019 (COVID-19) has claimed deaths of many people since its outbreak and declaration by WHO as a pandemic. Several research institutions and companies have made substantial efforts to develop COVID-19 vaccines.[1] On approval by the regulatory agencies Medicines and Healthcare Products Regulatory Agency and Food and Drug Administration (FDA), and WHO, COVID-19 vaccines have been used globally to suppress the virus. Various COVID-19 vaccines available in the market include Pfizer-BioNTech, AstraZeneca, Moderna, Johnson and Johnson, and Sinovac vaccines.[2,3] Cases of vaccine adverse effects reported at the FDA Adverse Event Reporting System as of March 2, 2021, include neurological symptoms such as paresthesia, muscle spasm, headache, myalgia, pain, and dizziness.[4] Rare cases of transverse myelitis, stroke, acute disseminated encephalomyelitis, facial palsy, tinnitus, tremor, seizure, dysphonia, and diplopia have also been reported in the literature.

Transverse myelitis is a medical condition emanating from spinal cord inflammation, which is a characteristic of neurological dysfunction of the sensory and motor tracts located on both sides of the spinal cord. Studies report transverse myelitis as a complication due to COVID-19 infection. Several case reports have linked neurological complications such as transverse myelitis to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection.[5-11] The clinical cases involved both males and females, aged between 28 and 63 years. The tests conducted initially confirmed

that the patients were SARS-CoV-2 positive. Blood analysis indicated leukopenia in addition to a slightly higher level of C-reactive protein. Spine magnetic resonance imaging (MRI) showed hyperdensity, especially in the transverse region. The lumbar puncture (LP) results and blood neutropenia conclusively suggest viral pathogen as the causative agent.[7]

Similarly, several transverse myelitis cases and other complications arising from COVID-19 vaccination, including thrombosis with thrombocytopenia syndrome, have been reported on CDC and FDA Vaccine Adverse Event Reporting System (VAERS).[12-16] The FDA VAERS system has reported 45 cases of transverse myelitis as of 27 April 2021. Five of the cases occurred after the Janssen vaccine, 19 after the Pfizer-BioNTech vaccine while 21 cases occurred after the Moderna vaccine.

CASE REPORT

A 16-year-old female, otherwise healthy, presented to the emergency department of the hospital with lower extremity weakness and difficulty in walking for 3 days. Detailed medical history revealed that the patient was administered a second dose of Pfizer-BioNTech-COVID-19 vaccine on July 26, 2021, and 2 days after the administration, the patient noticed weakness in her lower extremity. As the days went by the weakness gradually progressed to her upper extremity with numbness of both the lower limbs; and finally on August 11, 2021, the patient sought medical care. There was no history of being febrile before vaccination; no bowel or bladder dysfunction, headache, seizure, or loss of consciousness was reported. A physical examination was conducted to show that her temperature was 37°C, her blood pressure was 110/65 mmHg with a heart rate of 85 beats/minute, and 100% oxygen saturation with a respiratory rate of 18 breaths/minute. The neurological examination was unremarkable except for a moderate decline in the power of all extremities, decrease sensation to fine and pain stimuli in the lower extremity, increased tone with spasticity pattern, and hyperreflexia with present Babinski sign. Cranial nerves and cerebellum examination were unremarkable.

Hematology tests gave normal results with a complete blood count. Biochemistry tests show normal results [Table 1] and Brucellosis titer was negative.

Results for the MRI implied an acute inflammation on the spine as shown by the dorsal spinal cord, including contrast of the cervical [Figure 1], and thoracic [Figure 2] spinal cord, with normal MRI of the brain [Figure 3].

Table 1: Laboratory investigations with normal range used by the hospital

Test	Patient value	Normal range	Unit
WBC	8.31	4–10	10*3/uL
HGB	12.8	12–15	g/dL
HCT	36.5	40–50	%
MCV	78.8	83–101	fL
MCH	27.6	27–32	pg
PLT	285	150–400	10*3/ul
PT	12.9	11.5–15.5	Sec
PTT	36.7	26–40	Sec
INR	1.170	0.9–1.2	INR
ALT	7.8	16–63	U/L
AST	13.7	15–37	U/L
NA	138	136–145	Mmol/L
K	3.93	35–5.1	Mmol/L
BUN	2.2	2–6	Mmol/L
Creatinine	36	44–80	Umol/L
ESR	8	0–20	Mm/hr
CRP	0.0156	<0.3 mg/dl	Mg/dl

WBC - White blood cells; HGB - Haemoglobin; HCT - Hematocrit; MCV - Mean corpuscular volume; MCH - mean corpuscular hemoglobin; PLT - Platelets; PT - Prothrombin time; PTT - Partial thromboplastin time; INR - International normalized ratio; ALT - alanine aminotransferase; AST - aspartate aminotransferase; Na - Sodium; K - Potassium; BUN - Blood urea nitrogen; ESR - erythrocyte sedimentation rate; CRP - C-reactive protein

Figure 1: Cervical MRI shows a small lesion posterior to C2 and C3.

DISCUSSION

Transverse myelitis is a disorder characterized by the spinal cord focal inflammation that usually does not proceed to a painless chronic lesion. Major known causes of transverse myelitis are infectious such as viral, bacterial, or fungal infections and post-infectious immune triggered disorders such as Acute Disseminated Encephalomyelitis and Multiple Sclerosis and most of the above disorders have been ruled out by the presence of normal laboratory findings and normal brain MRI in our patient; one of the known causes of immune triggered transverse myelitis is post-vaccine including COVID-19 which we reporting in our case.[17] Viruses that

Figure 2: Thoracic MRI showing multiple plaques with a mild expansion of the cord The expansion is more obvious at the level of the plaque noted opposite T10 vertebra.

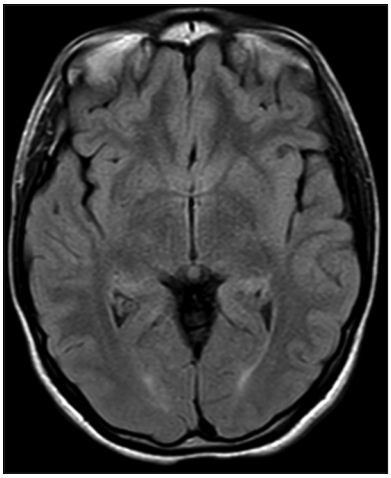

Figure 3: Brain MRI with contrast using FLAIR sequence showing normal brain image FLAIR - Fluid-attenuated inversion recovery.

are commonly linked to transverse myelitis are the herpes viruses particularly the zoster virus that causes chickenpox and the one that causes shingles. Most cases of transverse myelitis occur after recovery from an infection. Other rare causes of transverse myelitis are systemic autoimmune diseases; for instance, systemic lupus erythematosus Sjögren's syndrome that injures the spinal cord. Although many cases of transverse myelitis are correctly diagnosed, the actual causes for 30% of the cases are not known.[18]

Vaccines have also been reported as a potential cause of transverse myelitis.[19,20] Other case reports involving transverse myelitis due to administration of COVID-19 vaccines exhibit almost similar symptoms and results.[21-25] Malhotra *et al*. reported their first case of transverse myelitis as an adverse event following the administration of AstraZeneca/Oxford (viral-vectored, recombinant ChAdOX1) COVID-19 vaccine.[24] The patient who registered abnormal sensations on the lower limbs received the AZD1222 (ChAdOx1) vaccine 8 days ago. Results for the MRI of the spine revealed "an ovoid T2-hyperintense lesion in the dorsal aspect of the spinal cord at C6 and C7 vertebral levels" which signaled demyelination as a result of vaccination.[24]

Fitzsimmons and Nance also reported a case of transverse myelitis due to the Moderna vaccine.[25] The patient reported increasing lower back pain along with pain and numbness in the calves of both legs, which extended to the ankle. Laboratory tests and MRI of the lumbar and cervical regions of the spine revealed an increased T2 cord signal in the distal spinal cord and conus, suggestive of transverse myelitis due to vaccination.[25]

The majority of the transverse myelitis cases following COVID-19 vaccination were treated with 1 g of intravenous methylprednisolone for 5 days of which full recovery was reported in almost all the cases. Among the 133,321 reported cases by VAERS as of April 27, 2021, only 45 (0.003%) cases of transverse myelitis were reported. This is a confirmation that transverse myelitis is a very rare disorder. This is further confirmed by the statistics presented by Baxter *et al*. whose systemic review found only seven cases of transverse myelitis after administering approximately 64 million doses of vaccine.[26]

Study limitation

LP, for finding cerebral spinal fluid protein level, was not done as brain and spinal cord MRI study was sufficient for diagnosis and the patient showed rapid improvement with the treatment given.

CONCLUSION

Our 16-year-old patient was diagnosed with transverse myelitis that appeared after 2 days of administering the second dose of Pfizer-BioNTech COVID-19 vaccine and required hospitalization and management for 5 days. We publish our case for health administration to take notice of the possibility of serious adverse effects in the teenager population.

Ethic approval

Institutional Review Board-Makkah approved research conduct at Sep/10/2021 with reference number.

Availability of data and materials

The submitting primary author has the research data.

Authors' contributions

Study conception, AA; review and editing, AA, AS, MA, and HK; data collection and extraction, MA, AM, and SA; supervision, MA, and HK.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

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